THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—24TH YEAR. SYDNEY, SATURDAY, JULY 10, 1937. No. 2.

Table of Contents

BRONCHIECTASIS: ITS COURSE AND TREATMENT.[1]

By C. J. OFFICER BROWN, M.D., F.R.C.S.,

Surgeon Attending Out-Patients, The Alfred Hospital, Melbourne.

To those who have followed the literature on bronchiectasis during the last few years no apology is required for the presentation of this subject by a surgeon. For a long time it has been recognized that the pathological changes in established bronchiectasis are irreversible, and although much can be done to palliate the symptoms, the only cure for the disease is surgical extirpation, but, until recently, the mortality of the operation forbade its use except in desperate cases in the hands of the most intrepid surgeons. In 1931 Lilienthal reported forty-two personal cases, with a mortality of 64·3%.[25]

[1] Read at a meeting of the Victorian Branch of the British Medical Association on May 5, 1937.

The method of outlining the bronchi with iodized oil was introduced by Sicard and Forestier[1] in 1922, and aroused fresh interest in the disease. Early and mild cases were recognized with certainty, and the course of the disease was studied with an accuracy previously impossible. Surgeons were tempted by the exact localization of the disease to one or other lower lobe, and with the development of technique the mortality of lobectomy has been reduced to about 15% in the hands of those specially trained in this work. As a result of the introduction of lipiodol old methods of palliation were applied with fresh vigour and new methods were introduced in the hope that early cases would respond. Hygienic measures, postural drainage, bronchoscopic aspiration, artificial pneumothorax and phrenicotomy were all credited with success, but the periods of observation were too short and further study has shown that these methods rarely, if ever, cure even the mildest case, although some of them are of immense value in

controlling symptoms. Bronchoscopy must be specially mentioned as an aid to diagnosis and treatment, and it is fitting that the name of Chevalier Jackson should be remembered for his great work in this direction.

Ætiology.

Without going too far into the vexed problem of ætiology, it can be said that the primary cause of nearly all cases is infection, and in many the onset of the disease can be ascribed to one particular illness with respiratory infection.

Warner[2] surveyed 110 cases, studied and followed for periods up to eight years, and found that in 59% bronchiectasis commenced with a known illness. In 41% the onset was insidious without recognized acute respiratory disease.

Farrell,[3] in a study of 100 cases, attributed the disease to an acute respiratory infection in 45, to diseases of childhood in 12, and to bronchial occlusion in eight. In 10 cases the cause was unclassified, and in 25 unknown. In this series nasal sinus infection was present in 80%. While it is recognized that sinusitis and bronchiectasis are frequently associated, there is no real evidence that one is cause and the other effect.

Robinson,[4] from a study of lobes removed by operation, has shown that the most consistent pathological finding is a chronic inflammatory condition of the bronchial walls with various degrees of damage up to complete destruction of the musculo-elastic tissues. In most cases the lining epithelium was intact throughout, and consisted of normal stratified columnar epithelial cells with well defined cilia.

Macklin[5] demonstrated that the bronchi during inspiration both widen and elongate, and during expiration contract and shorten; thus in virtue of their own muscular and elastic properties they should be looked on as an active functioning part of the respiratory mechanism, and not merely as rigid air passages. Damage to their muscular and elastic elements, by lessening the force of recoil, leads to persistent over-dilatation of the tubes. In the early stages there may be only a muscular paresis, with loss of tone and consequent dilatation, and at this stage recovery could occur; but if the condition persists, accumulation of secretions leads to further infection, with ultimate destruction of the muscular and elastic tissues of the bronchial walls. Atelectasis or fibrosis of the lung parenchyma and central bronchial obstruction are additional factors tending to cause dilatation of the weakened bronchial walls. Atelectasis increases the physiological pull on the bronchial wall by replacing the intervening inflated elastic parenchyma by solid inelastic lung tissue, and increases the pressure difference between the lumen and outside. Intrapleural negative pressure is increased in the presence of atelectasis. Stagnation of secretion is further encouraged by the interference with the free passage of air along the bronchi, and leads to increased infection and still more weakening of the bronchial walls. Fibrosis acts in much the same way as atelectasis.

In a few cases a new growth or a foreign body acts as a ball valve, and air which gets past with the dilatation of inspiration is trapped when the bronchus narrows with expiration. Secretions are retained and infection follows and damage to the bronchial walls results. In the presence of obstruction coughing greatly increases the dilating force, but with a clear air-way, the influence of coughing *per se* is probably very slight.

Congenital Bronchiectasis.

Opinions are divided as to the frequency of a congenital factor in ætiology. It is extremely difficult to be sure that a case is congenital unless it is found in a fœtus or a new-born baby; and since practically all cases can be explained on an acquired basis, it seems unnecessary to postulate congenital defects that cannot be proved clinically or pathologically. Roberts, Roles and Todd and others consider that cases of marked sacculation localized to one main bronchus (usually the left lower) in young people without any serious antecedent disease are most probably congenital in origin. Graham and his co-workers describe a "grape type", and consider that a complete absence of normal branches of a main bronchus suggests a congenital ætiology. Congenital cystic lung is a well-known structural malformation.

Types.

Clinically it is helpful to divide cases into groups in accordance with the symptomatic severity of the disease and "dry, simple, septic, and fetid" or "slight, moderate and severe" are useful classifications. It should be recognized that the condition of the lung parenchyma of the diseased lobe has an important bearing on prognosis, and it may be normal, fibrosed, atelectatic or drowned in pus and secretion.

Apart from possible congenital defects, all cases probably pass through the tubular, fusiform and saccular stages as the disease progresses, so that these X ray "types" are not clinically significant.

Although bronchiectasis is an infectious disease, there does not appear to be any specific causative infecting organism. The presence of spirochætes is said to be especially associated with fetid sputum.

Course of the Disease and Prognosis.

Leonard Findlay,[6] in 1931, said that though undoubtedly recovery from bronchiectasis occasionally occurred, it was in the early and mild cases; as a rule the bronchiectatic condition steadily became more extensive, even although the symptoms diminish or entirely disappear. Roles and Todd,[7] in 1933, from a study of 106 cases, concluded that cases with occasional sputum had as bad a prognosis as those persistently septic. How bad this is is shown by their statement that out of 49 patients treated medically 23 were dead and nine were totally incapacitated after five years from diagnosis. In 14 of these cases the condition was dry, and of these 14 patients, within six years three were dead and two totally incapacitated. Only four remained dry.

Lebert[8] recorded the length of history in a series of 52 cases coming to autopsy; 21·1% of patients lived one year; 7·7% lived one to two years; 30·7%

lived three to five years; 15·5% lived six to ten years; 25% lived over ten years.

In Warner's[2] series the average duration of the disease since onset was ten years, and the longest forty-two years. Of the patients 23% were dead after an average period of nine years from the date of onset.

In 1902 Dyke Acland[9] reported a series of 60 cases from the Brompton Hospital; 76·6% of patients were under the age of forty. Farrell[3] found that 87% of his patients were under forty years of age.

Bronchiectasis is an incurable disease starting in early life (of Farrell's[3] patients 54% date their onset from the first decade) and a disease that is rarely seen in patients over forty, so the conclusion seems justified that in many cases it proves fatal before this age is reached.

The position is summed up by Flick,[10] who believes that a study of the ultimate fate of patients with bronchiectasis coming under observation early in life would reveal that many of them die from complications such as recurring pneumonia, pulmonary abscess, empyema and cerebral abscess. It is his conviction that a statistical study relating to prognosis by revealing the grave consequences of the disease, would support the view that early surgical intervention, in spite of its immediate risks, will in the long run give the best results. My study of the disease and its literature leads me to support this view, but much painstaking study of the life histories of individual patients is required before this important question can be finally settled.

Treatment.

It must be recognized that once the initial damage to the bronchial wall, with loss of muscle and elastic tissue, and dilatation has occurred, the condition will be permanent.

Postural drainage, adequately practised, helps the patient to empty the cavities. The dilated bronchi become habituated to the presence of secretion, and lose their cough reflex. Posturing acts partly by the mechanical action of gravity and partly through stimulation of the cough reflex in undamaged bronchi into which the secretion has drained by gravity. This is a very useful form of therapy, and its regular use may enable the patient to spend a tolerable day after his morning period of posturing and cough.

Drugs are of uncertain value, but inhalations and expectorants may aid the cough reflex, and respiratory antiseptics may help to sterilize the secretion and lessen the fetor. It is said that intravenous administration of arsenicals, by destroying the spirochætes, in some cases greatly reduce the fetor.

Bronchoscopic aspiration is even more effective than posturing in emptying the cavities, and bronchial obstructions can be recognized and dealt with. Areas of œdematous granulation tissue can be ironed out, and sometimes innocent neoplasms can be removed or strictures dilated, with consequent improvement of drainage. Antiseptic applications through the bronchoscope are possibly sometimes useful. Bronchoscopy causes some discomfort to the patient, requires the use of morphine and cocaine, and has to be frequently repeated.

Aided by hygienic measures with fresh air, sunshine and good food, these natural passage drainage methods are invaluable for improving the condition of any patient who has been neglected. For the advanced bilateral case no other form of treatment is as a rule applicable, and the patient's life can by these means be made more tolerable. No patient is ever cured, and as Roles and Todd[1] have shown, the outlook under this *régime* is bleak.

Surgical drainage of large cavities has been used with success by some operators for advanced cases with extreme toxæmia. A permanent fistula must of necessity remain.

In 1923 Graham[11] introduced his cautery method of drainage and extirpation, and in 1935 reported 76 cases with less than 15% operative deaths. Over 70% of the patients were free of symptoms, and had returned to work.

Graham's operation owes its success to the very free drainage it provides, and it is more valuable for cases of chronic pulmonary suppuration following an acute abscess than for primary bronchiectasis. It should be used when dense adhesions or severe toxæmia make lobectomy impossible. The risks of cautery pneumonectomy are air embolism and hæmorrhage. Air embolism is practically abolished if the head is kept below the level of the heart. Graham himself now reserves this operation for the patient with the more severe type of condition.

Compression and relaxation therapy has been given an extensive trial and has failed. In early cases pneumothorax or even phrenicotomy may sometimes prevent progress and resolution may occur. In these cases the dilatation is no doubt due to paralysis of the bronchial muscles rather than to actual destruction of the musculo-elastic tissues, and it is difficult to say that the patients would not have recovered without these measures. Regular bronchoscopic aspiration would probably do more for patients in these early stages than pneumothorax. In advanced cases these measures are futile and worse; their only effect is to collapse the normal parts of the lung. The bronchiectatic lobe may be atelectatic or fibrosed or adherent and will not collapse, and even if it does the cavities are as a rule unaffected. Lined with epithelium and with rigid walls, in contradistinction to the cavities of tuberculosis which are the result of destruction of the parenchyma, bronchiectatic cavities, even if they can be made to collapse, are not obliterated. Pneumothorax and phrenicotomy are not harmless, and should not be light-heartedly tried to "see if it will do any good". They reduce the power of coughing and encourage stagnation of secretion in the cavities, and further may lead to pleural thickening and adhesions and fibrosis in the collapsed lung, thus greatly increasing the difficulties of radical extirpation if it should be considered later.

Thoracoplasty has been widely used; it is rarely of benefit to the patient, and the risk is considerable. Hedblom,[12] in 1930, reported 32 cases of thoracoplasty with four early post-operative deaths and seven deaths later from complications or further operation. Three patients were completely relieved of symptoms, and the remaining patients were improved to a greater or less extent. Roles and

Todd[7] reported 20 patients treated by thoracoplasty; five patients were dead, and only six were well at the time of their report.

In cases of unilateral drowned lung with marked toxæmia and mediastinal displacement, thoracoplasty may help by compressing the parenchyma and lessening the toxæmia and allowing the mediastinum to return to a central position. In unilobar cases thoracoplasty sacrifices the whole lung, and not only the diseased lobe.

Extrapleural packing has nothing to recommend it, and has been rarely tried for bronchiectasis.

Lobectomy.

Lobectomy is the ideal method of treatment for cases in which the disease is confined to one lobe, and it is my belief that in the future it will become the only method to be considered at any stage of the disease when it is unilobar and the patient's condition permits it. At the present time there is still a volume of opinion which believes that patients with the mild or simple type of bronchiectasis with occasional sputum and those with the "dry" type frequently remain in good health throughout life and are not sufficiently inconvenienced or menaced by their disease to justify the risks of lobectomy. Recognition of these cases dates from the introduction of lipiodol, and the time is too short for a full understanding of the life-history of the patients. Operation in these cases should be a very safe procedure, and is, I believe, advised almost as a routine measure at the Brompton Hospital.

The grossly septic patient with copious fetid sputum and parenchymatous involvement and frequently satellite abscess formation can look forward to little improvement from palliative measures, and his outlook is so grave and his condition so noisome to his fellows and himself that even the heavy risk of operation in these cases is justified, and frequently welcomed by the patient.

Between these two extremes is the great bulk of patients with more or less copious infected sputum, fair health and occasional attacks of parenchymal infection. For these people there is little doubt that we can prognosticate a steady deterioration, and if the disease is unilobar, lobectomy should certainly be advised. Unfortunately it is too often found that there is involvement of both lower lobes or the whole lung on either side. Bilateral lobectomy or pneumonectomy is required for their surgical relief.

Reporting a case of total pneumonectomy for bronchiectasis, Walker[13] collected sixteen other cases, with four deaths, from the literature. Thirteen of these patients had been operated on since 1931, and amongst these there was only one death. No doubt some fatal cases have not been reported, but those who die after operation are usually intensely septic with fetid sputum, and a desperate remedy is applied to a desperate disease.

Eloesser,[14] Graham, Lewis[15] and Churchill[16] (five operations with one death) have reported successful removals of both lower lobes in stages, separated by an interval for the healing of the side first operated on, and if this proves to be a successful procedure the field for operation will be greatly widened.

It is difficult to obtain reliable information about the relative frequency of unilobar and multilobar disease.

Jex-Blake,[17] in a series of 108 autopsies, found that the disease was unilateral in 61 and unilobar in 34.

The location of the disease in 113 cases studied by contrast media bronchography by Hedblom[18] is shown in Table I.

TABLE I.

Location of Bronchiectasis.	Number of Cases.	Percentage.
Left lower lung	46	40·7
Right lower lung	31	27·4
Both lower lungs	32	28·3
Whole left lung	4	3·6
Whole right lung	0	
Total	113	

At the Alfred Hospital, unfortunately, very few of the cases seen are unilobar.

As the tendency of the disease is to spread by a process of spill-over of pus into healthy areas of the lung, it is obvious that if the diagnosis is made early there is a much greater chance of finding localized disease.

The Operation.—The one-stage method of lobectomy developed by Brunn[19] and modified and improved by Shenstone and Janes,[20] Roberts and Nelson[21] and Tudor Edwards[22] and others has been preferred by most recent operators, and its underlying principles will be briefly described.

Probably the future will see a flexible choice of one or two-stage operations to suit the individual patient, as is done at present with prostatectomy, colonic cancer *et cetera*, and as practised by Churchill[16] and others.

Pre-operative preparation is directed towards improving the patient's general condition and eliminating gross naso-pharyngeal infection. Postural drainage and bronchoscopic aspiration combined with hygienic measures will in a few weeks produce great symptomatic improvement in the majority of cases. In the absence of adhesions artificial pneumothorax, induced seven to fourteen days before operation, lessens the physiological disturbance when the chest is opened, and the patient during this period adapts himself to breathing with one lung. At the same time the collapse reduces the blood flow through the pulmonary vessels on the collapsed side, and in consequence there is much less circulatory disturbance when the pedicle of the diseased lobe is clamped. In the presence of a pneumothorax opening the chest is accompanied by surprisingly little upset to the patient. If a pneumothorax has not been induced, the upset on opening the chest is best avoided by making at first a small hole in the pleura and using the finger-tip as a stopper so that air is only very slowly admitted to the pleural cavity.

Anæsthesia.—In anæsthesia the choice lies between spinal anæsthesia and gas and oxygen. Spinal anæsthesia has the advantage of an active cough

reflex, and with adequate premedication, either with morphine and hyoscine or with intravenously administered "Nembutal"; "Avertin" is favoured by some of the leading exponents of lobectomy.

Patients are very intolerant to anoxæmia, and for this reason cyclopropane administered by the carbon dioxide absorption technique has been advised because it can be used in a much lower concentration than the more commonly used nitrous oxide. With general anæsthesia some provision should be made for the removal of secretion from the pharynx or trachea.

The patient lies on his good side, with the head of the table slightly lowered, and the Trumble[23] position, with the lower arm and shoulder hanging clear of the table, is most useful. The incision is a long one in the sixth or seventh space, and the ribs above and below may be divided posteriorly if more room is required. On entering the pleural cavity adhesions have next to be separated, and on their extent and firmness the severity of the operation largely depends. After the freeing of the adhesions the pulmonary ligament is divided and the lobe is then ready for removal. One or two pedicle clamps are applied, and the lobe is cut away. The stump is oversewn by interrupted or continuous sutures, which close the vessels and bronchi, and the cut edge of lung is then sewn over it. A tube is inserted through a stab in the intercostal space below the incision and the wound is closed securely. As the last stitches are being tied, the lung is inflated by the anæsthetist to expel air from the pleural cavity, and after the wound is closed and the dressing is applied it is advisable to aspirate any air that remains with a pneumothorax apparatus and a needle inserted through the second intercostal space in front. During these manœuvres the intercostal tube must be clamped, and it is not released until it has been connected to the suction drainage apparatus, by means of which a constant negative pressure is maintained until the lung has become sufficiently adherent to resist collapse when air enters the pleural cavity. For a few days there is a copious discharge of blood-stained serum, which then gradually ceases or becomes purulent if an empyema develops. In most cases a bronchial fistula develops about the end of the first week, and closes spontaneously a few weeks later. Shock depends largely on operating time, and thus is more severe when adhesions cause difficulty and delay. A blood transfusion should be given if there is any doubt about the patient's condition. As soon as possible the patient is placed in Fowler's position.

The dangers inherent in lobectomy are firstly those associated with the open pneumothorax inseparable from a major thoracotomy and due to acute disturbance of cardiac and respiratory function. These are the conditions of flapping mediastinum and paradoxical respiration, and are seen only when the mediastinum is mobile. Fortunately in bronchiectasis the mediastinum is often fixed by adhesions and pleural thickening, and in the absence of adhesions stabilization can be secured by the induction and maintenance of a pneumothorax for even one or two weeks. Positive pressure anæsthesia through an intratracheal catheter or with a close-fitting gas mask and a suitable machine provides a ready means of controlling these conditions and preventing their occurrence. The cumbrous pressure chambers used for the same purpose in years past have been completely superseded by pressure anæsthesia. Secondly, there are the risks due to infection; and thirdly, there are those due to accidents in the operative technique, peculiar to the thoracic cavity.

Infective risks are empyema, contralateral pneumonia, severe infection of the chest wall, mediastinitis and septicæmia.

Peculiar technical risks are serious hæmorrhage from wounding the fragile pedicle vessels, air embolism, and mediastinal emphysema and tension pneumothorax.

Empyema of some degree complicates the majority of lobectomies for infective conditions. An adherent upper lobe is recognized as the best means of limiting its extent, and adhesions in this area are deliberately produced as the first stage of most of the two-stage methods that have been advocated. In the one-stage method with a non-adherent upper lobe rapid reinflation of the remaining lobe and its early adhesion to the chest wall are relied on to limit infection if it should occur. The cut stump must always be infected, and Archibald[24] believes that pleural adhesions in non-tuberculous infections frequently contain living organisms, so that we must accept the probability of empyema and try to limit its extent.

Pneumonia in the opposite lung may result from the spill-over of secretions on the operating table, and measures must be taken to prevent this. Postural drainage or even bronchoscopic aspiration immediately before operation reduces the amount of secretion in the cavities, and at least operation should never be done before the patient has had time for his usual morning evacuation of sputum. The head-low operating position helps to drain secretion into the pharynx, and an efficient sucker in the pharynx or trachea is desirable if the patient is under a general anæsthetic. Some operators have blocked the bronchus on the side to be operated on with an inflatable rubber balloon on a gum-elastic catheter, and others have blocked the bronchus on the sound side by a catheter through which the anæsthetic is administered. Spinal anæsthesia has the advantage of an active cough reflex, and is a method now largely used at Brompton. The routine use of "Carbogen" after operation helps to prevent pneumonia.

Septicæmia and mediastinal infection were a consequence of the large infected sloughing stump left when mass ligatures were used, and are rare complications since the introduction of the Shenstone method of dealing with the pedicle, whereby a minimal amount of tissue is strangled and the vessels and bronchi are controlled individually rather than by mass ligation.

Wound infection is guarded against by the usual protective methods.

The large vessels of the mediastinum and lung root are very thin walled and fragile, and in the separation of dense adhesions to the mediastinum it is

easy to wound or tear one of these vessels, and control of the bleeding, which may be severe, is not easy. Air embolism may occur, and has been the cause of death in a number of reported cases.

Tension pneumothorax results from the partial opening of one of the cut bronchi a few days after operation, with the escape of air into the pleural cavity, and a valve action which prevents its return. This danger is obviated by effective suction drainage and early expansion and adhesion of the remaining lobe.

Lessening of mortality has resulted from the overcoming of many of these risks, and nowadays physiological disturbances, mediastinitis and tension pneumothorax have been robbed of their terrors. Empyemata are usually localized, and easily controlled. The real risks at the present time are pneumonia and those due to technical error.

Results of Lobectomy.—In a condition showing such varying degrees of severity, mortality figures are of little value unless some indication of the type of case operated on is given, and this has not often been done. Nevertheless the lessening in mortality figures published over the last few years has been astounding, and one may confidently anticipate the time when lobectomy and pneumonectomy for bronchiectasis will be at least as safe as prostatectomy and other major operations undertaken for serious visceral disease.

In 1931 Ballon, Singer and Graham[25] collected reports of 212 cases of lobectomy for bronchiectasis, with 52 deaths, or a mortality of 24·5%.

At Brompton Hospital, up until the end of 1935, 107 patients had been operated on, with 15 deaths, or a case mortality of 14% (Susman,[26] 1937). And recently Churchill[16] has recorded 40 completed lobectomies for bronchiectasis with two deaths or a mortality rate of 5%. Excluding two cases with one death for which the operation was performed by methods not now recommended, he has done 38 lobectomies with one death since the present technique was developed, and thus has the truly amazing mortality rate of 2·6% for these cases.

Survivors.—Lilienthal[27] in 1925 claimed complete cures in 24% of all patients operated on, and improvement in all other survivors. In all his patients the condition was advanced, and as lipiodol investigation was not used, it is likely that many of the patients had unrecognized disease on the good side. In view of this and of the large number of deaths—47%—the proportion of cures was gratifying.

Reviewing his first 35 patients at periods of from five years to a few weeks after their discharge from hospital, Tudor Edwards[22] stated that 28, or 80%, were healed and symptomless. Six had some residual symptoms, but were greatly improved, and one still had a bronchial fistula and a small residual empyema cavity of over a year's duration.

Churchill[16] reports 30 patients cured, including one with a bilateral condition and one subjected to total pneumonectomy; three patients died, one after a total pneumonectomy, and five are classified as improved. In 11 other cases the operative procedure was unfinished at the time of writing. Five of these are bilateral cases and one side remains to be operated on, and six are two-stage operations in which only the first stage has been done.

In conclusion I should like to say that bronchiectasis is a much more serious disease for the individual than pulmonary tuberculosis, and a disease that is not very uncommon. Persistent cough and sometimes hæmoptysis may be the only symptoms in early cases, and the classical textbook picture is seen only when the disease is advanced and, too often, multilobar. Every patient with unexplained cough or hæmoptysis who is not rapidly relieved by simple measures should be thoroughly investigated, and if tuberculosis can be excluded by repeated sputum examinations, and if the absence of an active lesion is discovered on radiological examination of the chest, a bronchogram by the lipiodol method should be done. In this way bronchiectasis will be diagnosed or excluded. In some bronchoscopy will be required to demonstrate small intrabronchial neoplasms which may be innocent and are amenable to bronchoscopic treatment. I am confident that bronchoscopy will eventually become as commonplace as cystoscopy is today.

When bronchiectasis is diagnosed, the patient's future should receive the same earnest consideration that is given to a patient with tuberculosis. It is reasonable to try the effect of a course of conservative treatment; and under a *régime* that practically amounts to sanatorium treatment with the addition of postural drainage, and bronchoscopy at least once, to exclude the possibility of a causative bronchostenosis, all patients will show marked symptomatic improvement. Unfortunately few will maintain this improvement when they return to active life, and sometimes even while the symptoms are improving the disease is progressing. Progress should be watched by repeated lipiodol examinations, and any sign of advance should raise the question of surgical treatment. Lobectomy is the operation of choice, and no other operation should be considered when this is possible. Pneumonectomy and bilateral lobectomy are now established as reasonably safe operations for a desperate disease, but with ready means of accurate diagnosis and a profession alive to the dangers of bronchiectasis we may hope to relieve the majority of patients before the need for these extensive operations arises.

Appendix.

My personal experience of lobectomy is limited to four cases. All of the patients recovered from the operation and are still alive.

The first operation was done in 1934, and the case was reported in 1935,[28] when the patient was very fit. Unfortunately the disease has progressed in the remaining lung tissue and the end result must be considered a failure.

In the second case the bronchiectatic condition was limited to an atelectatic right middle lobe, which was removed. The patient's drainage tube was accidentally displaced on the fourth day and air entered the pleural cavity and an upper pneumothorax developed and was persisting on her discharge from hospital three months later. Convalescence was somewhat stormy after removal of the tube, but she was very well when she went home, and her sputum was reduced from a maximum daily output of fifteen ounces to about two ounces. It is too soon to estimate the end result in this case.

Two patients are still in hospital. One of these was operated on three weeks ago and now has a discharging basal empyema and a bronchial fistula, but should do well. The other, a child of seven, is very well one week after operation. Spinal anæsthesia was used with great satisfaction for the last two cases.

References.

[1] J. A. Sicard and J. Forestier: *Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, Volume XLVI, March 17, 1922, page 463.

[2] W. P. Warner: "Factors Causing Bronchiectasis", *The Journal of the American Medical Association*, Volume CV, 1935, page 1066.

[3] John T. Farrell, junior: "The Importance of Early Diagnosis in Bronchiectasis", *The Journal of the American Medical Association*, Volume CVI, 1936, page 92.

[4] W. L. Robinson: "Bronchiectasis", *British Journal of Surgery*, Volume XXI, October, 1933, page 302.

[5] C. C. Macklin: "The Musculature of the Bronchi and Lungs", *Physiological Reviews*, Volume IX, 1929, page 1. "Functional Aspects of Bronchial Muscle and Elastic Tissue", *Archives of Surgery*, Volume XIX, 1929, page 1212.

[6] Leonard Findlay and Stanley Graham: "Prognosis in Bronchiectasis", *Archives of Disease in Childhood*, Volume VI, 1931, page 1.

[7] Francis C. Roles and Geoffrey S. Todd: "Bronchiectasis", *The British Medical Journal*, October 7, 1933, page 639.

[8] H. Lebert, quoted by Carl A. Hedblom: "Practice of Surgery", by Dean Lewis, 1935.

[9] Theodore Dyke Acland: "Bronchiectasis: A Clinical Study", *The Practitioner*, Volume LXVIII, April, 1902, page 379.

[10] F. B. Flick: Personal communication to J. T. Farrell, junior (quoted in [3]).

[11] Evarts A. Graham: "The Treatment of Pulmonary Suppuration", *Annals of Surgery*, July-December, 1927, page 174. "Discussion on Papers on Lobectomy", *Journal of Thoracic Surgery*, Volume IV, April, 1935, page 368.

[12] Carl A. Hedblom: "Pathogenesis, Diagnosis and Treatment of Bronchiectasis", *Surgery, Gynecology and Obstetrics*, Volume LII, February, 1931, page 406.

[13] R. Milnes Walker: "Total Removal of a Lung", *British Journal of Surgery*, Volume XXIV, July, 1936, page 7.

[14] Leo Eloesser: "Bilateral Lobectomy", *Surgery, Gynecology and Obstetrics*, Volume LVII, 1933, page 247.

[15] Ivor Lewis: "Bilateral Lobectomy for Bronchiectasis", *British Journal of Surgery*, Volume XXIV, October, 1936, page 362.

[16] Edward D. Churchill: "Lobectomy and Pneumonectomy in Bronchiectasis and Cystic Disease", *Journal of Thoracic Surgery*, Volume VI, February, 1937, page 286.

[17] A. J. Jex-Blake: "Bronchiectasis", *The British Medical Journal*, May, 1920, page 591.

[18] Carl A. Hedblom: "Practice of Surgery", by Dean Lewis, Volume V, 1935.

[19] Harold Brunn: "Surgical Principles Underlying One-stage Lobectomy", *Archives of Surgery*, Volume XVIII, 1929, page 490.

[20] N. Shenstone and M. Janes: "Experiences in Pulmonary Lobectomy", *Canadian Medical Association Journal*, August, 1932, page 138.

[21] J. E. H. Roberts and H. P. Nelson: "Pulmonary Lobectomy. Technique and Report of Ten Cases", *British Journal of Surgery*, Volume XXI, October, 1933, page 277.

[22] A. Tudor Edwards and C. Price Thomas: "One-stage Lobectomy for Bronchiectasis", *British Journal of Surgery*, Volume XXII, October, 1934, page 310.

[23] Hugh C. Trumble: "A Note on the Lateral Position", *The Australian and New Zealand Journal of Surgery*, Volume II, July, 1932, page 68.

[24] Edward Archibald: "A Consideration of the Dangers of Lobectomy", *Journal of Thoracic Surgery*, Volume VI, April, 1935, page 335.

[25] Harry Ballon, J. J. Singer and Evarts A. Graham: *Journal of Thoracic Surgery*, Volume I, 1931-1932, page 502.

[26] M. P. Susman: "The Surgical Treatment of Bronchiectasis", *The Australian and New Zealand Journal of Surgery*, Volume VI, January, 1937, page 248.

[27] Howard Lilienthal: "Thoracic Surgery", Volume II, 1925, page 174.

[28] C. J. Officer Brown and C. A. Marshall Renou: *The Australian and New Zealand Journal of Surgery*, Volume V, October, 1935, page 183.

THE BRONCHOSCOPIC TREATMENT OF BRONCHIECTASIS.

By MILTON COUTTS,
Sydney.

WITH A COMMENTARY

By ALLAN S. WALKER, M.D. (Sydney),
Sydney.

THIS communication is intended as a preliminary survey of twenty cases of known or suspected bronchiectasis. Seventeen of the patients have been submitted to bronchoscopy, eight of them only on one or two occasions, while the remaining nine have presented themselves in all for over one hundred bronchoscopic treatments.

Need of Special Treatment for Bronchiectasis.

Every medical practitioner is no doubt familiar with the usual signs and symptoms of bronchiectasis, but though the invalidity and isolation of young people so affected must have been generally observed, it must be admitted that these unfortunate people have been largely left to their own devices.

Some suffer recurrent acute exacerbations which bring them to a pitiable state of gross sepsis with ultimate death from toxæmia; others drag on, to become totally unfitted for any place in society; their education is perforce neglected, they cannot hope to retain employment, and because of the offensive odour of their breath and copious sputum they are socially ostracized. What might be termed the lowest grade of treatment is represented merely by the repetition of a "prescription" for an expectorant mixture; to this is added some attempt towards eradication of sepsis in the naso-pharynx and accessory sinuses, and a still further effort is made in some cases by the employment of postural drainage, but the limitation of usefulness even of this will be referred to later. In bronchoscopic drainage, however, we have a method which will achieve more than any of these, though it is usually dismissed in a short paragraph, even by the most modern writers on diseases of the chest, when discussing the treatment of suppurative disease of the lung.

Scott Pinchin and Morlock,[1] writing five years ago on this subject, reported disappointing results from artificial pneumothorax, phrenic evulsion and thoracoplasty, and though they recognized that "cure" must lie in surgical removal of the lobe, the high mortality rate was a deterrent, so that they preferred to reduce the sputum and render it less offensive and get their patients back to work by means of bronchoscopic lavage and medication.

Soulas[2] (February, 1937) summarizes the results of bronchoscopic treatment of bronchiectasis thus: Cure is rare (15%), and in general occurs only in recent cases following pulmonary abscess, bronchopneumonia or foreign body. Social cures, that is symptomatic improvement with partial restoration to the normal state, occur in 28%; simple improvement, necessitating a periodic and prolonged treatment, occurs in 52% of cases.

Analysis of Twenty Cases, with Reference to Clinical Features.

Age and Sex.—Sixteen patients were female; the youngest was five, and the oldest seventy-one years of age; all but four were under thirty-three years of age, and half the patients were twenty years and under. Others have noticed this preponderance of youthful patients, and have asked the pointed question: "What is the expectation of life in bronchiectasis?" There is reason to believe that it is well below normal figures.

Two of the older patients were of the chronic type, not much inconvenienced by the malady; the old lady of seventy-one denied ever having a cough until an attack of influenza a few months previously. Four patients were males, aged five, seven, twenty-nine and thirty-six years.

Social Status.—All but three patients were of the public hospital or contract practice class.

Evidence of Sepsis in the Upper Respiratory Tract.—Nasal sinusitis was found in eighteen; in all these patients suppurative antritis was present. In the two oldest patients the nasal sinuses have not been investigated. Of the eighteen cases of proved nasal sinusitis, nine date back to infancy or early childhood, and eight patients have had it "all their life" or "as long as they can remember"[1], which seems to amount to the same thing.

The association of nasal sinusitis with bronchiectasis has been recognized for many years, but unfortunately its importance has not been sufficiently stressed by the profession. Numbers of children have had their tonsils and adenoids removed as an attempt to cure the chronic rhinitis and chronic bronchitis. A large proportion recover, but many are unrelieved, the muco-purulent nasal discharge and the bronchitis persisting with acute exacerbations. Surely these children have suppurative nasal sinusitis, and is this not bronchiectasis in the making?

Dental Sepsis.—Dental sepsis seemed to vary according to the age and degree of offensiveness of the sputum. Gross dental caries was common in children with offensive sputum; in older patients gingivitis and pyorrhœa were common.

Clubbing of the Fingers.—Clubbing of the fingers, though usually thought to be common in bronchiectasis, was present in two patients only, both females with gross bronchiectasis and offensive sputum.

Blood Examination.—Blood examination was not carried out as a routine measure, but two girls, both very ill, were found to have a definite grade of anæmia, one with a marked lymphocytosis, the other with a high leucocytosis; the latter patient, whose anæmia was of the hypochromic microcytic variety, has since died.

Febrile Attacks.—Febrile attacks were of frequent occurrence in the patients under the age of sixteen years; they then tended to disappear in the less severely affected patients. In school children feverish attacks of so-called "influenza" occurred, lasting from two to ten days, usually every few months, but occasionally every month. In some cases there were bronchitic exacerbations during the winter. These attacks are due to pneumonitis following blocked drainage from the lungs, with consequent toxic absorption.

Loss of Sleep.—Patients able to lie flat were not much disturbed by coughing, and slept well. When much secretion was present, sleep was possible only by the adoption of Fowler's position. In one case the patient, a woman of thirty-three years, who now is "socially cured", slept thus for four years.

Gastro-intestinal Disturbances.—Gastro-intestinal disturbances were not common. Several patients had to choose their food carefully; fatty and indigestible foods were vomited. Three (females) vomited every morning, one of them two or three times a day. During the febrile attacks and while the sputum was excessive and offensive the appetite was always impaired.

Physical Appearance.—The physical appearance is misleading, only four of the twenty patients (two bedridden) looked thin and emaciated. The other sixteen had the outward appearance of being reasonably well nourished, the children and girls with ample subcutaneous fat and rounded faces and shoulders. Both men were of slim build and weighed over eight stone. Yet only four were fit to do any work, and all lost time from work during their febrile periods, which were of varying frequency and duration. Occasionally they absented themselves from work because of fatigue. Despite this appearance of robustness, there is a dulness of eye and absence of smile of greeting which are replaced by the bright eye and ready smile only with returning physical and mental well-being. This appearance of pseudo-robustness was remarked upon by R. Graham Brown[3] seven years ago.

Fatigue.—Fatigue is a very prominent and distressing symptom. Children of school age do not appear to suffer from fatigue, or at any rate it is not easily elicited. Of the seventeen patients of sixteen and over, thirteen complained of constant fatigue, those going to work (four) were in the habit of stopping at home for periods ranging from one day to one month. This resulted in loss of employment or the seeking of lighter employment.

Breathlessness.—Breathlessness was apparent in the advanced cases, and was present to some degree in every case. Several looked mildly surprised when asked if they were not breathless on exertion, the reason being that they arrange their lives to avoid exertion, walking slowly at all times, and of course taking no part in any sport. Running or laughing always precipitates an attack of coughing.

Hæmoptysis.—Hæmoptysis was noted in four cases; it was of considerable degree in one case only, and one other patient had spat up blood daily for the past year.

Pneumonia and Pleurisy.—The presence of pneumonia and pleurisy was difficult to determine owing to the signs in the chest during the febrile periods being interpreted as due to lobar pneumonia. Seven patients had had pleurisy, and three had had "pneumonia" in infancy and early childhood.

Pertussis and Measles.—Pertussis and measles, when associated with bronchopneumonia, are usually regarded as a potent cause of bronchiectasis. Only in five patients could I obtain a convincing history of such relevant infections during the first four years of life. My personal belief is that the origin of the bronchiectasis in such people may be the pertussis or measles, provided that these infections are also the source of the chronic suppurative nasal sinusitis which is common to all.

Restriction of Social Activities.—Restriction of social activities was a striking feature of the histories of more than half the patients. Young people in particular feel very badly about this aspect of the complaint, and this is a strong argument in favour of a more vigorous form of treatment.

Site of the Lesion.—Pneumography was carried out in eighteen of the cases, lipiodol being introduced into the lower bronchus of each side through the bronchoscope, and X ray films were taken as soon as possible thereafter. Though with few exceptions

the lipiodol was sufficiently distributed in the bronchi, in every case the lower lobes only were seen to be involved. In twelve cases the lesion was bilateral, in four the left base only was affected, in one the right base only. In one case no definite evidence of bronchiectasis was seen in the films, but gross sinusitis was found. It is of interest to record that in this case, though visual proof of bronchial dilatation was lacking on radiographic examination, not only did the patient have up to ten ounces of sputum daily, but a specimen of pus obtained in a Clerf bottle from a lower bronchus was found to contain a hæmolytic streptococcus. Surgical drainage of the sinuses and three bronchoscopic treatments were followed in this case by a course of autogenous vaccine with an excellent result, the sputum being now very small in amount.

There is one observation of interest in the unilateral cases. As seen through the bronchoscope, the bronchus of the unaffected lung always contains some pus even in the lower bronchus. Yet this lung does not apparently tend to become bronchiectatic, since the ages of three of the five patients with unilobar bronchiectasis are twenty-nine, forty-four and sixty respectively. Is this due to some innate defect in the diseased bronchial tree, or even to the existence of a congenital dilatation of the bronchi, as some believe? Three of the patients in this survey though not suffering from tuberculosis have been inmates of sanatoria for tuberculous patients, one for four years, one for nine months, and the other for two months.

Bronchoscopic Findings.

The findings in the more advanced cases are illustrated by one of the very bedridden patients, a girl of sixteen, who had "nummular" sputum, that is, large grey coin-like masses floating in saliva and also greenish sputum on the bottom of the container.

On examination nearly the whole of the main bronchi and part of the trachea appeared to be lined with a grey shaggy membrane, which when sucked and washed off, revealed a red granular mucosa. The thinner pus was found in the lower main bronchus and terminal bronchi.

The day after treatment, the "nummular" masses were not evident in the sputum, which was now copious, greenish, offensive pus, easier to expectorate.

When bilateral basal bronchiectasis is present the mucosa of the lower main bronchi is nearly always red, granular and in some cases swollen and œdematous, so that the mouths of the terminal bronchi are definitely narrowed and rounded of margin, instead of being sharp of margin as in the normal tree.

This constriction of the orifices of the bronchi interfering with drainage must be a very big factor in helping to maintain the disability, if not to aggravate it and induce chronicity. For example, it has been noted that improvement in general health and lessening of the cough and sputum run parallel with the improvement actually seen in the condition of the bronchial mucosa. Whether this latter is directly due to lavage and medication or to the lessened irritation of the retained purulent secretion is hard to determine; possibly both factors are concerned. When the pus is aspirated from the lower bronchus, the dorsal terminal bronchus is usually seen to be full of pus, which rises to the level of the main bronchus during expiration and recedes out of sight with inspiration.

It is easy to be misled on the first examination of a patient with unilateral bronchiectasis. For example, in a case of left basal bronchiectasis the right main bronchus is, as usual, examined as a matter of routine, and some pus may be found, while the terminal bronchi are seen to be wide open. Examination of the left side after aspiration of pus now reveals terminal bronchi that are appreciably smaller, and it might be assumed that the lesion is on the right side till the pneumogram reveals the right side normal and the left bronchiectatic. It must be remembered at this first examination that the surgeon does not wish to spend time on a detailed examination, being anxious not to upset the patient in any way, but on later examinations he will find that the left bronchi have a red thick and granular mucosa which frequently bleeds readily if too vigorous a suction is used.

This emphasizes the point that the condition of the mucosal lining is all important.

Another tell-tale factor is the respiratory movement. On the normal side, when viewed through a bronchoscopic telescope, the bronchus shortens during expiration, bringing the orifices of the terminal bronchi right up to the tip of the bronchoscope, and during inspiration it lengthens and dilates, appearing to recede an inch or more in some cases. These changes have been remarked by various writers, and the degree of the movements has actually been measured by Ellis.[7]

On the affected side the respiratory movement is very slight, or in some cases nil, and I have observed that in the bronchiectatic area the narrowed orifices of the bronchi of drainage undergo no appreciable change. The most constantly affected terminal bronchus on the right side seems to be the dorsal terminal, and on the left side the medial terminal or cardiac bronchus.

In one case of left basal bronchiectasis the mucosa of the lower left bronchus was so œdematous that the lateral terminal bronchus was not evident, the intermediate bronchus was seen as a closed slit, and the medial or cardiac bronchus was not more than two millimetres in diameter. After many treatments when the mucosa had returned to normal, all three were wide and round, so that the next bifurcation of the medial two could be seen, giving the impression of five tubes in all.

In two or three cases the mucosa of upper main bronchi looked very smooth and gave the impression of being very thin, and an outstanding feature was the disposition of the blood vessels, which were seen running in parallel lines down the long axis of the tubes.

I have noted that the mucosa, which at the first two or three examinations was red and granular, appeared subsequently to present a mottled appearance, which is difficult to describe. It is thinner and paler and has a flecked appearance and the orifices of

the terminal bronchi are not reddened or appreciably thickened, yet the patient is still coughing several ounces of purulent sputum; but at this stage it is usually inoffensive, and an observer seeing the picture for the first time might be led to suspect that no bronchiectasis existed.

Routine Treatment.

Before treatment is commenced, it is desirable to have a plain skiagram of the chest and nasal sinuses.

Patients are admitted to hospital not less than one hour before examination. The appropriate dose of morphine and atropine or morphine and hyoscine is given hypodermically, the dose of morphine for all those over sixteen varying from 0·01 to 0·15 gramme (one-sixth to one-quarter of a grain).

When it has been noted that morphine produces vomiting and distress, "Sodium Amytal" has been employed, but for the best result with this drug the patient is admitted to hospital the night before and given "Sodium Amytal" 0·18 gramme (three grains), and the dose is repeated in the morning one hour before examination. "Nembutal" has been similarly employed with equally good results.

For adults (and children who are amenable to reason) local anæsthesia is employed, in the form of "Decicain" 2% and adrenaline one in a thousand in equal parts. Latterly I have altered the proportion of "Decicain" and adrenaline to three parts to two parts, with equally good results. I have used "Decicain"—formerly "Pantocain"—for five years, and exclusively for four when local anæsthesia is employed in surgery of the nose and throat. I have never seen a patient show any signs of toxicity from its use, nor have I heard of addiction to the drug.

The ordinary inhalation anæsthetics are not only unnecessary and quite impracticable when endoscopic manœuvres are to be carried out, but they are definitely risky to the patient.

For children requiring a general anæsthetic, "Avertin", as used by John Boyd,[4] has been the best in my experience. It takes up to ten minutes to produce local anæsthesia, and the length of time of the bronchoscopic treatment varies between ten and twenty minutes, so that the complete procedure is finished in less than half an hour.

At the first examination the patient lies on the table and is told to relax as much as possible, and asked not to strain or wriggle. She is assured that the proceeding is not painful or distressing, that she may cough if she wishes, and that no one will attempt to restrain her or even as much as hold her hands. She is asked to point to any area of discomfort, as, for example, the lip may be pinched against the teeth and not observed by the operator. In reply to queries from the operator the patient usually replies with short nods of the head.

From 10 to 30 cubic centimetres of eusol are used for lavage in each side, and by suction and coughing the secretion is all removed. The patient is then requested to cough, and if it is a dry cough and no secretion enters the lower bronchus, 10 cubic centimetres of "Titrol" in oil are instilled and left in.

In a case of bilateral bronchiectasis the same proceeding is then carried out on the other side.

After treatment the patient returns to bed, and usually prefers to sit up. Some read the paper, others prefer to sleep off the effects of the sedative. After an hour or so food and drink can be taken and the patient is at liberty to go home.

Treatment of the Nasal Sinus Infection.

Of the children in Class I (below), my experience is that, if the purulent nasal drainage has not cleared up within a few months following intranasal antrostomy, repeated antrostomy—to enlarge the drainage opening—does very little good, and the radical operation must be resorted to.

With effective cure of the antritis, the frontal sinusitis and ethmoiditis, when present, tend to clear up. Gas and oxygen have been the anæsthetics mostly used. Recently, "Avertin" was employed as a complete anæsthetic, with excellent results. Ether in my experience tends to aggravate the condition in the lung, and has been considered the cause of typical "febrile" attacks which have followed its use.

In Class II cases, when the nasal sinus infection has not been already dealt with, it has been found beneficial to carry out bronchoscopic lavage a few times to improve the general health, before submitting the patients to operation.

When the infection is of long standing, as in most of these cases, I have had very unsatisfactory results from intranasal antrostomy, and now always perform the radical operation.

Comparison of Agents that have been Employed in the Treatment.

It has been maintained by some observers that it is quite sufficient to aspirate the lower bronchus, and that this measure alone is sufficient to bring about improvement in the patient's condition.

This must be true to some extent, but if after aspiration five or 10 cubic centimetres of water are introduced into the lower bronchus, they are returned as a thick opaque admixture of pus, mucopus and water, showing that after simple aspiration there is left still a quantity of pus which has been lodged in the inaccessible areas.

It would seem logical to substitute some mild antiseptic for the water, and 3% eusol has proved admirably useful in this capacity, and the wash-out can be repeated two or three times, until the returning fluid is seen to become clearer.

Other solutions I have tried are: aqueous "Metaphen", 1 in 5,000; aqueous "Melasol", 1 in 50 and 1 in 100 and weaker; aqueous "Novarsenobillon".

"Metaphen" was discarded because it produced a severe burning pain when washed down the inflamed mucosa, and also because, it being a mercurial, there was risk of liberation of free iodine if lipiodol had recently been instilled into the lung.

"Melasol", because of its soap content, rendered the secretion gelatinous and ropy, thereby defeating the objects of lavage; it also was irritant and produced excessive coughing.

"Novarsenobillon" solution (0·3 gramme in 20 cubic centimetres of distilled water) was used when it was found that the fetid odour of the secretion was

not destroyed by eusol and other deodorants such as "Titrol".

It was assumed that a spirochæte was responsible for the odour, and in two cases in which this agent was used the results were remarkable. One wash-out will usually destroy the odour and reduce the sputum to a minimum and cause rapid disappearance of the inflamed and œdematous mucosa at the site of the lesion. Stronger solutions seem to be irritant, and also cause the secretions to become thick and gelatinous.

After suction has rendered the tubes clean and dry, it is advantageous to introduce into the affected area some non-irritant antiseptic and deodorant, and the solutions described below were employed in the treatment of the cases mentioned in this analysis. The usual procedure was to introduce 10 or 20 cubic centimetres of the solution through a sucker tube into the lower bronchus, and from here it spread over the mucosa and ran, by gravity and aspiration (inspiration), into the affected areas.

"Lipiodol" is a 40% solution of iodine in poppy seed oil, and its introduction for purposes of pneumogram has been noted to produce a lessening of the secretion and some appreciable improvement. Iodine is an antiseptic and poppy seed oil possesses drying properties, thought to be due to some terpenes which it contains.

"Euflavine", 1 in 2,000 parts of saline solution, because of its odour-destroying property, was used once or twice. It was non-irritant, but did not appear to have much influence on the odour.

"Metaphen" in oil, 1 in 5,000, was used a number of times; in one case it appeared to have a very beneficial influence.

"Titrol", the oil of the *Melaleuca alternifolia*, possesses several admirable qualities. In my experience it is non-irritant and non-toxic, it possesses a Rideal-Walker coefficient of eleven, yet the pure oil can be rubbed on the skin or dressed on wounds without injuring the tissues. A 5% solution of "Titrol" in olive oil is most efficacious in reducing the sputum and destroying the odour. When there is much secretion the odour of "Titrol" disappears from the breath in one week or less; as the cough and secretion lessen, the sputum remains deodorized for up to one month or more. When the sputum is thin and copious, probably most of the "Titrol" is coughed out in the first twenty-four or forty-eight hours.

A 5% solution of "Titrol" in poppy seed oil, which I have latterly employed, makes the secretion thicker and opalescent, gives it a faint pink tinge and reduces the sputum considerably. Being a heavy, thick oil, it provokes more cough, but has the advantage of retaining the "Titrol" for a longer time in contact with the diseased tissue.

I have been interested to note that a number of patients who have been treated by several methods have expressed their personal preference for the eusol-"Titrol" sequence.

Frequency of Treatment.

The frequency of treatment varies according to the degree of the severity of the disease.

At the commencement of treatment the object is to reduce the odour; it is difficult to reduce the sputum at first.

The next treatment should be undertaken as soon as the patient or his relatives notice the return of the odour. This may be three, five or seven days or longer, but with increasing treatments the period is lengthened. A rough estimate would be say twice a week for two treatments, then every week for four or five, then bi-weekly, and later monthly and bi-monthly. (See Case VII.)

Owing to the difficulty in procuring beds in public hospitals (where most of this treatment must be carried out) a few of the patients have shown improvement and have then relapsed owing to the irregular spacing of their treatments.

Case III (mentioned later) is a good example, for after eght treatments at two, three and four-weekly intervals, a relapse occurred. The next eight treatments were carried out in rapid succession with astounding results.

Accessory or Home Treatment.

Postural drainage, an important part of the treatment, is left to the patient with varying degrees of efficiency depending on the age, outlook and state of health.

All patients with basal bronchiectasis benefit by a morning and evening "tip up", that is to say they posture themselves with the head and shoulders down and the pelvis up for not less than half an hour. In my experience anything less than half an hour is of very little use.

A common method is to lie across a low bed with the thighs and pelvis supported on the bed, and the shoulders supported on a pillow on the floor; during this time some of the secretion drains down from some of the smaller bronchioles and is easily coughed out. By this means coughing during the day and night is very much diminished.

People who can sleep lying flat do better by learning to sleep prone with the foot of the bed raised, the angle of tip being gradually increased. This usually increases the night cough and sputum, but lessens the day cough.

H. V. Morlock,[5] in discussing left basal bronchiectasis, states that the patient can get satisfactory drainage by lying on the right side with the foot of the bed raised not less than twenty inches. Morlock illustrates very clearly the results of faulty position during sleep by quoting three cases of unilobar basal bronchiectasis in which the patients lay on the correct side for efficient drainage, but neglected to raise the foot of the bed, with the result that all developed an upper lobe abscess on the opposite side due to inhalation of septic material during sleep.

To summarize his conclusions, the correct position for nocturnal postural drainage is to lie on the abdomen with the foot of the bed raised not less than twenty inches.

Comparison of Postural and Bronchoscopic Drainage.

Since bronchiectatic cavities are found chiefly in the lower lobes of the lung, it would seem reasonable that if the patient were to remain postured with the

shoulders lower than the hips, these cavities might empty themselves by gravity. This is true to a certain extent, and it is recognized that posture has gone a long way in alleviating the cough and sputum, but it is not practicable to maintain this posture for any great length of time, except possibly in the case of the child or the young unemployed. In the milder cases patients may learn to sleep with the foot of the bed raised.

In severe cases, when there is much secretion, this is not possible owing to "smothering" caused by the drainage from the drowned area (which in any case is not used for respiration) into the normal aerated areas of the lung.

When the patient is so ill as to be confined to bed, he will naturally assume the sitting-up or Fowler's position, and the mere suggestion of tipping him up for drainage produces in him a state of panic. It is not until his cough has lessened and his distress has very much ameliorated that he will attempt posture; and he can more quickly be brought to this state by two or three bronchoscopic aspirations, to which he will readily submit if he is assured that the procedure will be quite painless.

A point of great interest and importance is how efficient or otherwise postural drainage is in emptying the lung. Bronchoscopy proves that it is not very effective. The smaller terminal bronchi do not appear to empty, even by the effort of coughing in the inverted posture.

On several occasions one patient "postured" herself before bronchoscopy, and while lying on the table prior to examination again coughed till "dry". When the bronchoscope penetrated to the lower main bronchus, she was again able to cough secretion right out of the tube; and as I pointed out earlier, suction removes more secretion, and finally the wash-out removes still more, and probably not all of it then.

Another interesting fact is that the patient, who is almost well, that is to say "socially cured", will usually report that for the first couple of days after a bronchoscopic treatment there is no sputum even at the night and morning "tip up". I take this to mean that there is practically none, perhaps a drachm or so.

It is surely only by the use of a bronchoscope that one is able to determine which lobe of the lung contains the fetid sputum, and to employ a special medicament to wash out the offending lobe only.

It seems logical to claim that bronchoscopic drainage with its use of suction and lavage will help to remove that element of collapse which is recognized as being of great importance in the bronchiectatic process, particularly in children. The importance of this factor of collapse, with its associated non-drainage of the lung, is illustrated by G. H. Newns,[6] who reported the case of a child, aged nine years, a sufferer from asthma for seven years, who had collapse of a bronchiectatic lobe of one lung. Treatment by inhalation of carbon dioxide and postural drainage for eight hours daily over a period of four months caused complete reexpansion of the affected lung and apparent disappearance of the bronchiectatic dilatations.

Bronchoscopy in Children.

The problem of carrying out bronchoscopic treatment in children is one of anæsthesia. The basal anæsthetics used in conjunction with local anæsthesia appear to offer a solution, and the best seems to be "Avertin", as recently advocated by John Boyd,[4] but I omit the morphine in these cases.

After the larynx has been sprayed with the "Decicain"-adrenaline solution, bronchoscopy can be carried out with ease and without restraint of the patient. "Sodium Evipan" and rectal administration of paraldehyde were tried at different times, but with faint success.

Boyd reports no deaths from "Avertin" anæsthesia among seven hundred patients treated according to his plan. He uses 0·175 to 0·2 gramme of "Avertin" per kilogram of body weight, in 3% solution, and employs in addition an appropriate dose of morphine and atropine according to age.

Classification of Cases.

In this series there are a number of patients who have as yet been submitted to only a few treatments, but the following abbreviated case reports illustrate the results that may be obtained.

This analysis is far too restricted to allow of any dogmatic conclusions being reached, especially as the maximum time of observation of any one patient is not greater than sixteen months. I feel, however, that in bronchoscopotherapy we have something that is practical and simple to perform; and, considering the years of invalidity of most patients, the transformation after even a few weeks of treatment is in my experience so outstanding that I am stimulated to pursue this mode of treatment further.

For purposes of treatment I think the patients should be divided into three classes.

Class I. Children from Infancy to Thirteen or Fourteen Years.

I choose the age thirteen or fourteen because about this age the average child undergoes a mental change so that manipulations formerly requiring a general anæsthetic can now be performed under local (and "vocal") anæsthesia.

Two avenues of treatment are available: postural drainage and bronchoscopy under general anæsthesia. Up to fourteen is the school-going period, and much of the day, as well as the night, may be spent in the posture of drainage. It is surely possible that in a growing child posture alone may bring about a cure if diligently persisted in, provided always that the upper respiratory infection has been efficiently eradicated. I am convinced, however, that bronchoscopic treatment under "Avertin" will greatly accelerate the cure, if cure is possible.

Class II. Children of Fifteen Years and Young Adults Manifesting Signs of Active Absorption, Fatigue and Febrile Attacks et cetera.

Bronchoscopotherapy offers the greatest hope of salvation to children of fifteen years, and young adults manifesting signs of active absorption, fatigue and febrile attacks *et cetera*, for how can we foresee what is going to become of the young bronchiectatic patient? Is he (or she) going to carry on into chronicity or meet an untimely end?

Taking examples from this series would seem to be the most forceful way of demonstrating the need of help in which these unfortunate people stand.

CASE I.—K.J., a female patient, fifteen years of age, was underdeveloped and breathless, with constant fatigue and frequent febrile attacks, associated with physical signs involving the whole of both lungs and with copious offensive sputum. This child died; the circumstances are reported later.

CASE II.—P.G., a female, aged sixteen years, was emaciated, bedridden (Fowler's position), dyspnœic and cyanosed, with copious offensive sputum and constant day and night cough with double basal bronchiectasis. She was discharged from hospital after five treatments, able to be "up and about". After the twenty-third treatment (ten months after the first) she was "better than she has ever been", and was going to pictures *et cetera*. When the twenty-sixth treatment was due, the patient was reported to have "influenza". Since then she has not returned for treatment.

CASE III.—G.S., a female, eighteen years of age, was thin and feeble. She had spent four years in a tuberculosis sanatorium. She had had three years' broken schooling, and was always tired. She fainted frequently. She had febrile attacks every two or three months. Left basal bronchiectasis was present, with offensive green sputum. She had nine treatments at intervals of from two weeks to one month; then she had an acute febrile attack when the left lung filled with pus. Then followed eight weekly treatments. The sputum was reduced from sixteen ounces to one ounce, and it was non-offensive. Her weight increased half a stone in the last three weeks of treatment. She was sent to a convalescent home, and was given permission to play tennis. She was to return in one month for survey.

CASE IV.—B.C., a female, aged twenty-two years, an invalid pensioner, was thin, pale and slightly cyanosed. She had ten ounces of green offensive sputum daily, with double basal bronchiectasis. Nine treatments were given at fortnightly intervals. The patient returned to the country looking very well. She had no cough except at the night and morning "tip up", with a small amount of inoffensive mucopus. She was "socially cured" when last seen five months ago.

CASE V.—Y.A., a female, sixteen years of age, had offensive green sputum in mouthfuls frequently day and night from double basal bronchiectasis. She had febrile periods for about ten days in every month. The odour was destroyed after the fifth treatment. Cough and sputum diminished about 50% after the tenth treatment. Weight increased half a stone. She has had no febrile attacks since the beginning of treatment six months ago. She is now going to work regularly, and is still under treatment.

CASE VI.—B.M., a male, aged twenty-nine years, began to decline in health two years ago. He had acute febrile attacks of "influenza" about three times a year. He had two pints of blood-streaked very offensive sputum daily for the last year from a left basal bronchiectasis. He was unable to lie down to sleep many nights owing to cough and sputum. The sputum was reduced to one ounce after nine treatments at weekly intervals. The odour was destroyed by a "Novarsenobillon" wash-out at the eighth treatment. The sputum increased to four ounces, with slight return of odour after playing six sets of tennis. The odour was again destroyed by a "Novarsenobillon" wash-out. The patient looks very well; he is working and leading a normal life. He is still under treatment.

CASE VII.—K.F., a female, aged thirty-three years, was exhausted and emaciated, and had a copious and very offensive sputum. She had febrile attacks three or four times a year. She was in bed for one month in Fowler's position, and was going down hill. She had slept in Fowler's position for four years. She had double basal bronchiectasis. She was discharged from hospital after the fourth treatment (one month from the commencement of treatment). The sputum was rendered non-offensive after the eighth treatment. She was leading almost a normal life after the ninth treatment, and was able to lie flat to sleep. She was "socially cured" in six months after the eleventh treatment. She has no cough except at the night and morning "tip up". She has increased in weight two and a half stone in one year. She has had twenty treatments.

In this case the decline was sudden, and started later in life. The patient was under treatment for sixteen months. She reports for treatment at periods of one month or six weeks when the sputum becomes "heavy".

Class III. Adults Not Losing Ground and who may have No Febrile Periods.

In this series two women, with unilateral basal lesions, aged forty-four and sixty respectively, are indifferent in their attitude towards treatment, and will probably live to a comfortable old age without any treatment. At the same time I feel convinced that, by reducing the redness and œdema of the mucosa of the lower bronchus and by reducing the sputum, better health would be enjoyed. In the younger of the two women I have had indications that this would be true.

Deaths.

One death occurred in the series, and is worth special emphasis, as it demonstrates the risk attendant upon severe bronchiectasis.

This patient was an undersized child, a female, aged fifteen years. She was obviously ill when she began treatment, and had a well marked hypochromic microcytic anæmia, with a considerable leucocytosis. There was a bilateral condition of bronchiectasis with a large abscess in the lower lobe of the right lung. She was given five treatments; none of these gave rise to any difficulty or anxiety, in fact one of the treatments was used as a demonstration of bronchoscopic lavage before a meeting of the local medical association. Two days after the last treatment general surgical emphysema appeared following a severe bout of coughing, and the patient died a few hours after the development of urgent symptoms. *Post mortem* examination showed that there was right-sided pneumothorax, due apparently to the rupture of an emphysematous bleb, of which there were many along the anterior border of the lung. There was no evidence of operative trauma. The lung was moored to the pleura by many bands of adhesions, and a large epithelialized cavity was found in the lower lobe communicating with dilated bronchi. The presence of subcutaneous emphysema made the recognition of the pneumothorax difficult. In any case I do not think that this catastrophe was in any way related to the treatments.

Apparatus Used.

It may be of interest to mention the apparatus and instruments used in carrying out this investigation. They are as follow:

1. The "G-U" head rest, the Scott Pinchin-Morlock modification of Haslinger's head rest with adjustment for varying height of patients.
2. The Scott Pinchin-Morlock aspirating bronchoscope with telescope, and sucking tubes with flexible tip, as described in *The Lancet*.[8]
3. The Scott Pinchin-Morlock operating bronchoscope with telescope.[9]
4. Haslinger's 6·5 millimetre bronchoscope and Jackson's 5 millimetre bronchoscope, for children.

I have never felt the necessity for using a laryngeal speculum, such as the Jackson, for introducing the bronchoscope, and find that the ease of direct introduction is a matter of posture.

Acknowledgements.

The stimulus which encouraged me to undertake the treatment of these patients came from H. V. Morlock and the late A. J. Scott Pinchin, whose methods and technique I was privileged to observe at The Victoria Park Chest Hospital, London. To these gentlemen I am deeply indebted.

I wish to acknowledge the great assistance given me in the carrying out of this work by Irwin Smith, Medical Superintendent of the Western Suburbs Hospital, also the help, advice and encouragement of Allan Walker, who has shown great interest and has seen much of the work done. He has been good enough to write a commentary on this paper from the physician's point of view.

Conclusions.

1. Bronchoscopotherapy is a logical, simple, efficient and safe method of treating bronchiectasis. It is not distressing to the patient, who, once having experienced benefit, comes back for further treatments.
2. Bronchoscopy permits us to see, to know and to treat the tissues at the sight of the lesion.
3. Working people lose a minimum of time; those preferring no sedative need devote only a few hours to treatment.
4. Nasal sinusitis appears to be the predominant causal factor, and every infant and young child with a "loose" cough not cured by tonsillectomy and adenectomy must be suspected of nasal sinusitis and of being a potential bronchiectatic.
5. "Avertin" as employed by John Boyd would seem to be the choice of anæsthetic for young children.
6. "Decicain" with adrenaline as a local anæsthetic has proved completely satisfactory in every way.
7. Bronchiectasis seems to be an affliction of the poorer classes of the community, females predominating in this series.
8. Clubbing of the fingers is not an essential sign of bronchiectasis.
9. Bronchiectasis is predominately a disease of the lower lobes of the lungs, dictated by gravity.
10. The most efficient method of bronchoscopic treatment would seem to be lavage with an aqueous antiseptic and the instillation of a non-irritant antiseptic and deodorant.
11. For optimum results treatment must be carried out frequently at the commencement, with lengthening periods as the condition improves.
12. Postural drainage is very important, but on the one hand it is not essential in the maintenance of good health, nor on the other is it sufficient for adequate drainage.
13. "Titrol" appears to be a very efficient antiseptic and deodorant. Two cubic centimetres of pure oil (20 cubic centimetres of 10%) have not produced any irritant or toxic effects when left in the lungs.
14. In a well organized clinic, such as that at Victoria Park, London, with skilled help available for the theatre work and for induction of local anæsthesia, it is easily possible to carry out full bronchoscopic diagnosis and treatment on about four patients per hour, most of whom are able to return home the same day. Similar facilities, without great cost to our public hospitals, might well be afforded the local sufferers from bronchiectasis. The personnel for routine treatment consists of four people, the operator, the anæsthetist, the theatre sister, and an experienced nurse to stand by for attention to aspirators, table posture, and the instillations of medicaments *et cetera*.

References.

(1) A. J. Scott Pinchin and H. V. Morlock: "Chronic Pulmonary Suppuration and its Treatment by Bronchoscopy and Drainage", *Tubercle*, September, 1932; "The Bronchoscope in the Treatment of Pulmonary Suppuration", *The Lancet*, September 17, 1932, page 605.
(2) A. Soulas: "Bronchoscopotherapy in Broncho-Pulmonary Suppuration, its Mechanism and Results", *Proceedings of the Royal Society of Medicine*, February, 1937, page 492.
(3) R. Graham Brown: "Bronchiectasis", THE MEDICAL JOURNAL OF AUSTRALIA, August 28, 1930, page 274.
(4) John Boyd: "Avertin as a Complete Anæsthetic in Children. A Survey of Seven Hundred Cases", *The British Medical Journal*, June 1, 1935, page 1120.
(5) H. V. Morlock: "Postural Drainage", *The Lancet*, February 13, 1937, page 381.
(6) G. H. Newns: "Collapse of Lower Lobe with Bronchial Dilatation: Apparent Resolution", *Proceedings of the Royal Society of Medicine*, December, 1936, page 107.
(7) Maxwell Ellis: "The Mechanism of the Bronchial Movements and the Naso-Pulmonary Reflex", *Proceedings of the Royal Society of Medicine*, December, 1935, page 527.
(8) A. J. Scott Pinchin and H. V. Morlock: "New Inventions", *The Lancet*, March 26, 1932, page 671.
(9) A. J. Scott Pinchin and H. V. Morlock: "A New Bronchoscope and Bronchoscopic Technique", *The British Medical Journal*, March 2, 1935, page 420.

COMMENTARY.

(A. S. WALKER.)

The value of bronchoscopy is, or should be, familiar to most physicians by now, but it is chiefly thought of as a diagnostic method, and to a lesser extent as a means of treatment, the latter being restricted more or less to cases of foreign body in the lung or pulmonary abscess. It may be remarked in passing that the great value of bronchoscopic drainage in the hands of an expert is not yet generally recognized in abscess of the lung; even in recent literature it is sometimes ignored. But more controversial is the use of this method in the treatment of bronchiectasis. Two objections are advanced: one, that the relief gained is so temporary that it is not worth while, the other, that actual harm may be done by washing infected material to other parts of the lung. I believe that not only are there many subjects of bronchiectasis who are immensely benefited by endoscopic treatment, but that in some cases it may be possible to limit or even to check the destructive march of this serious pulmonary lesion. The physician first of all must have a clear picture in his mind of the possible condition of the pulmonary apparatus. General bronchial dilatation is not common; this appeals rather to the morbid anatomist seeking a museum piece. In one recent series of 100 cases, reported by J. T. Furrell in *The Journal of the American Medical Association* of January 11, 1936, 64 patients had unilateral disease only, and the cavities, though usually in the lower lobe, are surprisingly often found in its upper or middle zone. But the patient's condition depends not upon the presence of dilatations *per se*, but on the state of the bronchial mucosa. A clean healthy ciliated mucosa of normal thickness spells quiescence, but once infection becomes established the mucosa loses its cilia and either becomes smooth and atrophic or swollen and irregular; the cells flatten, may become stratified, or may even disappear. At a still later stage even the basement membrane may disappear, and a vascular granulation tissue forms pus; the wall of the bronchus may share the general structural failure, and thus the pathway is clear for the hæmolytic streptococci, the Vincent's spirillum and other organisms to gain access to the intimate lung tissue. The lung in the affected part is already poorly aerated, and may be even collapsed, as is often seen in the radiological studies of children with bronchiec-

tasis. It is easy to see how bleeding, chronic toxic absorption and attacks of spreading pneumonitis are such frequent concomitants of bronchiectasis. The evidence in favour of the original source of this infection being the upper respiratory tract is very convincing; in my experience sinusitis is invariable in children and young persons suffering from bronchiectasis. We may now ask what may be expected from regular and efficient drainage of the lung. If the problem is tackled early enough before damage is extensive, the mucosa may attempt recovery; what does the physician advise in such cases? He sees that infected sinuses, tonsils *et cetera* are efficiently dealt with; he seeks to raise the general resistance of the thin young patients, who are often unduly coddled by anxious parents. He may also advise postural drainage, and perhaps administer a vaccine in the hope (rather a forlorn hope, surely) of enhancing the immunological response of the patient's tissues to the predominant organisms. A great deal of time, faith and money have been expended on vaccine therapy in bronchiectasis, probably with just what benefits time, faith and money may bring. But it must be admitted that here we stop short. Can we drain the bronchial tree easily or efficiently by posture, exercise or cough mixtures? Few would be prepared to answer this entirely in the affirmative. Bronchoscopic drainage certainly offers a possible solution: the method is exact, it allows direct visualization of the affected parts, it permits full and free drainage and local medication. Does it do any harm, and is it possible actually to cause a spreading pneumonitis by lavage of the infected parts of the bronchial tree? I am confident that it does not. For over ten years, since first becoming interested in the bronchographic X ray study of the lungs, I have been struck with the ease with which material may be coughed from one part of the lung to another. If lipiodol is instilled into a bronchus and the patient coughs violently, an X ray picture shows a remarkable "splash" effect of oil scattered intimately to different parts of the lung. Now if coughing will do this, why do not bronchiectatic patients more often give themselves bronchopneumonia when they cough? That chronic infection gradually spreads thus is probably true, though more important is the recognition of the breaking down of the mucosal barriers described above. I do not believe that the bronchoscopist's manœuvres are as likely to cause spread of infection as the patient's own pulmonary activities, and criticism of endoscopic therapy on these grounds is not based upon a sound foundation of theory or practice.

But will lavage and suction of the infected bronchial tree do any good? The answer is that it does. It allows aeration, it removes infected material that no other method will touch, and it can assist in local deodorization, a most important point for the patient. We must now ask if the patient is likely to submit to a lengthy and unpleasant course of treatment. This depends upon the character of the patient, the degree of relief he may be afforded, and more especially the deftness of the bronchoscopist. I recognize from personal attempts to handle a bronchoscope that the operator must have an extended experience, and be specially equipped both mechanically and by nature. The modern instruments have made this work almost easy, and when we see patients voluntarily returning again and again for treatment, we realize that once they gain the requisite confidence they are little disturbed by the manœuvres. A *sine qua non* is that the operator shall be patient enough to be prepared to carry out repeated treatment, and an expert in working with local anæsthesia. With the exception of basal anæsthesia for children or occasional very nervous patients, nothing more than local anæsthesia is needed. In fact, the use of general inhalation anæsthetics is a negation of the value, the safety and the practicability of this method; it is twenty years out of date.

I believe from what I have seen in various clinics that if an enthusiastic team is available there is hope for some of these patients. The severely damaged patients, who produce vast quantities of foul pus daily, cannot be cured, but their lives may be made tolerable. The younger patients may be perhaps cured if treated early enough, or at least the progressive spread of their lesions can be prevented. That the damaged mucosa does improve and regenerate, if given a chance, is true; aeration of the lung may increase also. If a bronchiectasis may be rendered more or less dry, it is less of a menace, and the effort is well worth while.

Finally, it must be realized that bronchiectasis is very far from being a benign disease; the elderly patients with chronic bronchiectases of mild grade are often quoted, but this is only one side of the picture. Furrell found in his series of 100 representative cases that 22 patients were under the age of ten years, 28 under twenty years, and 27 under thirty years; in other words, 80% of the patients were quite young. What happens to these young patients? Exact statistics are not available, but it would be surprising if these young people had the average expectation of life. Faced with the possibility of hæmoptysis, of local lung abscess from local thrombophlebitis, and even cerebral abscess, of bronchopneumonia, and all the host of other ills that may assail their under-nourished bodies, it is doubtful whether many of them in the popular phrase "make old bones". If anything can be added to the unsatisfactory treatment generally practised, it is only right that its worth should be recognized and due encouragement given to it.

THE THERMOLABILITY OF SUBSTANCES RESPONSIBLE FOR THE SELECTIVE MOVEMENT OF TUMOUR CELLS IN THE PRESENCE OF TUMOUR BLOOD.

By WARNFORD MOFFETT, M.D., Ch.M.,
Sydney.

PREVIOUSLY certain phenomena of chemiotaxis were studied by cultivating fragments of chick spleen in fluid media.[1] A special diffusion vessel was evolved in order to relate such cell movements to different known concentrations of salts.[2] Later, an apparently similar phenomenon was observed

when tumour cells were maintained in association with blood from tumour-bearing animals.[3] Briefly, cells of the mouse tumour, S37 of the Imperial Cancer Research Fund, moved towards "homologous" tumour blood taken from the same animal and away from "heterologous" blood taken from a different tumour-bearing animal of the same strain. Tumour cells also responded to the unequal saline concentration[4] employed in the early work.[2] On the other hand, spleen cells from the chick embryo do not appear to exhibit any characteristic response to tumour blood.[3] Negative experiments were also recorded with mouse spleen cells and mouse tumour blood, but further work would be desirable.[3]

It was then found that mouse tumour cells were repelled (negative chemiotaxis) from specimens of human tumour blood.[3] The reaction appeared to correspond to that observed with "heterologous" mouse tumour blood. A brief investigation with normal human blood and with blood taken from pregnant women did not show this characteristic reaction. Thus the results furnished a basis for a diagnostic cancer test. A series of fifty patients were then investigated along these lines, the clinical diagnosis being withheld until after completion of each test. The results showed that the test was about 80% reliable when positive for cancer (negative chemiotaxis relative to the test blood) and only about 50% reliable when negative (no selective migration).[4] Very slight reactions were observed with many inflammatory conditions, but these were considered to be negative. Further work was then devoted to improvement of the reliability of the test and to a simplification of the technique. An all-glass diffusion vessel was designed, tested and found to be satisfactory.[5] At the same time, an independent worker attached to the Royal Prince Alfred Hospital, Sydney, carried out 100 tests and obtained 91·66% accuracy when positive for cancer and 68·75% accuracy when negative.[6]

Technique.

The present paper represents the first step in an attempt to identify the substances present in tumour blood, which are responsible for the phenomenon observed. The technical procedure has been described fully in previous papers. Briefly, it was found that a unilateral blood clot always exerts a positive chemiotaxis.[2] Accordingly the test blood is balanced with a sample of normal blood, the two clots being placed in reservoirs at each end of the diffusion vessel, which is filled with saline. The tumour cells are then placed in the centre of a narrow connecting channel, where they can be observed with a low power microscope.

In the present work three of the all-glass diffusion vessels[5] were set up on a flat tank (Figure I) after being sterilized by wetting with ether and flaming. A little sterile vaseline was applied to the flat surface of the glass so that the cover slip would adhere. A tumour-bearing mouse was then anæsthetized and the dilated heart was removed from the chest whilst the great vessels were held with forceps to prevent undue loss of blood. A little blood was then squeezed into one reservoir of each diffusion vessel, where it was allowed to clot. Normal blood was added in a similar manner to the other reservoir of each vessel. A cover slip was then flamed and applied warm to the vaselined surface, but the lateral groove (see Figure I) and a segment of each reservoir were left uncovered.

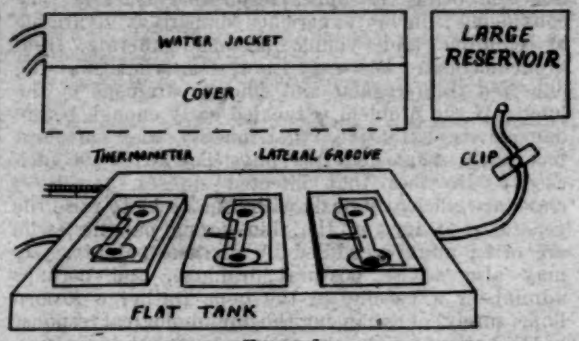

FIGURE I.

Diagram of apparatus for heating blood samples. Three diffusion vessels, with blood clots and central tumour fragments indicated, are resting on the flat tank. When hot water is being run through, the cover is lowered into position. The cover water jacket was added after completion of some of the early experiments. See text.

Saline solution was then added by the lateral groove and a cover was placed over the flat water tank. Warm water was run through the apparatus for a fixed time, usually thirty minutes, after which the lid was removed to facilitate cooling, whilst cold water was run through for a further five minutes. A few drops of saline solution were then added to each diffusion vessel by the lateral groove to make good loss by evaporation and to ensure that the tumour cells would not be injured by contact with a hypertonic solution. A small piece of mouse sarcoma S37 was then conveyed to the saline solution in the lateral groove, where it was crushed lightly to facilitate separation of cells. The fragment was then pushed into the central connecting channel with a platinum wire. Molten paraffin was run on to the exposed saline surfaces, and the apparatus was rendered water-tight. An initial drawing was then made, and reference marks were scratched on the cover slip and included in the drawing to facilitate accurate observation of the position of the cells. A check drawing was then made after an hour's incubation, and a final drawing after twenty-four hours' incubation. It was a very difficult task to determine when a migration ceased after various degrees of heating, and to guard against prejudice previous drawings were covered whilst a drawing was being made. Then finally the three drawings of each slide were compared and the verdict given as + or — for positive and negative chemiotaxis, relative to the tumour blood, 0 for no selective migration, and ? if it was impossible to form a definite opinion.

Thermal Measurements.

Before systematic experiments were carried out an attempt was made to determine the temperature of the saline solution in the diffusion vessel whilst warm water was run through the flat tank.

A thermal junction and galvanometer were calibrated by means of a beaker of water and a standard thermometer. This procedure was repeated

frequently, and the graph current/temperature was always practically a straight line, but the absolute values varied slightly on different occasions, probably owing to small variations of resistance in the leads and at the terminals. Temperature readings were then obtained when the thermal junction was placed in the diffusion vessel, and various curves temperature/time are shown in Figure II. The results were obtained as follows:

Firstly the large reservoir (see Figure I) was heated to the required temperature and then the warm water was run through the flat tank at a slow rate. The tank thermometer rose in about thirty seconds to a value which remained constant at about 3° C. below that of the large reservoir. The procedure was the same as for a migration experiment (see above), and

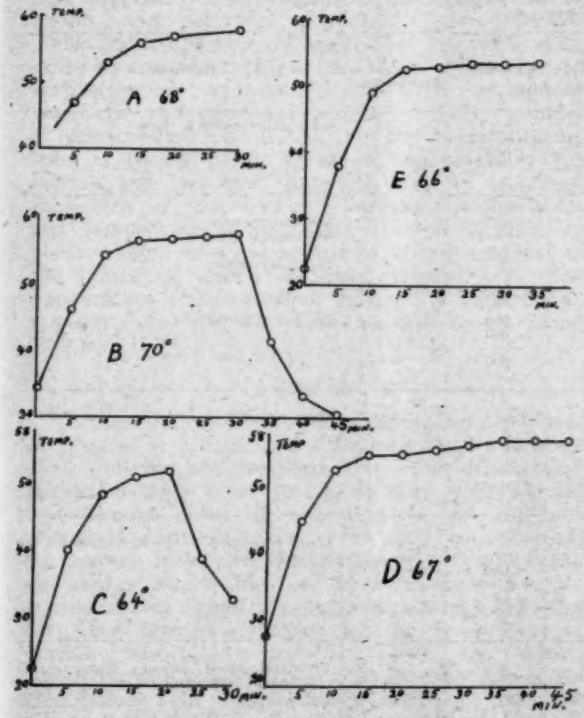

FIGURE II.

Curves showing the temperature reached by the saline in the diffusion vessels when hot water is run through the flat tank for various times. *A*, early trial in open oven; *B* and *C*, thirty and twenty minutes' heating, followed by rapid cooling as in the migration experiments; *D* and *E*, longer periods of heating. The temperatures after the letters are those shown by the thermometer in Figure I. Subsequently the lag between the plate and the maximum vessel temperature was reduced to 1½°, but the form of the curve was unaltered.

readings were taken at five-minute intervals. On inspecting the curves, all of which are similar, it will be seen that about ten minutes were required to heat up the saline solution owing to the relatively large heat capacity of the glass diffusion vessels. Omitting curve A, which represents a trial carried out in a small oven with the door partly open, all the results show a considerable lag, about 13° C., between the tank temperature and the highest temperature reached in the diffusion vessel. Heating was carried out for thirty and twenty minute periods (curves B and C, Figure II), but even in the forty-five minute period recorded in curve D there was a final difference of about 10° C. The lag was measured frequently, and it was found to be fairly constant during the winter months. Evaporation was considered to be the main cause. In warmer weather, however, the lag diminished, and it was realized that the diffusion vessel took up a temperature intermediate between that of the water in the tank and the cover in contact with the air. Accordingly the cover, which had been a thin sheet of metal, was provided with a water jacket and the lag was reduced to 1·5° C. This was quite satisfactory, and it occurred at a time when sufficient confidence had been obtained in the biological results to justify such a degree of accuracy. New time/temperature curves were obtained, but except for the small lag they were similar to those illustrated. The facts determined by means of these curves were: firstly, that the initial ten minutes should be subtracted from the apparent time of heating; secondly, that the temperature in the middle of the subsequent period should be recorded; and thirdly, that the temperature falls rapidly on cooling off and there is no risk of injuring tumour cells by heat after five minutes.

Migration Experiments.

The first reaction to be investigated was the positive chemiotaxis to tumour blood (homologous) which is taken from the mouse supplying the tumour fragment.[3] The tumour was dissected out and placed in a Petrie dish of saline solution during the heating, but was not cut up until required, and there was never any evidence of loss of vitality. In the table of results, HMTB stands for homologous tumour blood, and NB for normal mouse blood, the time and temperature values will be clear, and the symbols used for the results have been explained. Each result has also been plotted graphically in Figure III, taking the

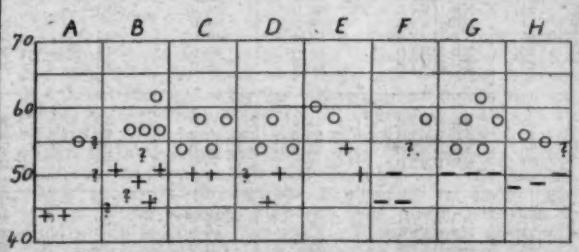

FIGURE III.

Diagram of the results shown in the table. The figures give the temperature of the vessel as explained in the text; + and − represent positive and negative chemiotaxis respectively, and 0 represents no selective migration, whilst no opinion was formed in the case of ?; *A*, early work in oven; *B*, *C* and *D*, homologous tumour blood heated for 30(20), 20(10) and 40(30) minutes respectively; *D*, unilateral blood sample; *E*, heterologous tumour blood; *F*, plasma; and *G*, human blood.

majority verdict when the readings differ. Preliminary experiments in an oven indicated the approximate temperature of inactivation [Figure III (*a*)]. The tank described was then designed so that the vessels need not be disturbed until they were sealed. Further results indicated that the temperature of inactivation of the above reaction was between 50° to 54°, taking

the time of heating as twenty minutes [Figure III (*b*)]. An attempt was then made to determine the rate of inactivation of the substances involved by heating for shorter (ten minutes, 20—10) [Figure III (*c*)], or longer (thirty minutes, 40—10) periods [Figure III (*d*)]. However, these investigations all furnished the same inactivation temperature, and the present apparatus did not permit one to follow up this investigation by means of very short periods of heating. A few experiments were then carried out with a unilateral sample of tumour blood. The inactivation temperature is of the same order, but possibly a few degrees higher [Figure III (*e*)]. This was not unexpected, as a single clot would furnish salts and various other diffusible substances in addition to those associated with tumour growth.

In the next series of experiments different tumour-bearing mice were used to supply the tumour fragment and the tumour blood (heterologous, HTTB in the table). As observed previously, this gives negative chemiotaxis relative to the tumour blood, and the reactions correspond better with the clinical cancer test mentioned. As before, a temperature of inactivation between 50° and 54° C. was obtained [Figure III (*f*)].

It was observed that hæmolysis became prominent after about 54° C., and the red pigment tended to spread to the tumour cells in the connecting channel. One wondered if the constant temperature of inactivation for different reactions was due to the presence of blood pigment *et cetera* interfering with cell movement.

TABLE OF RESULTS.

Number.	Blood Tested.	Tank Temperature. °C.	Actual Temperature. °C.	Time (Minutes).	Time Less Ten Minutes.	Result.	Control Preparation.	Remarks.
1	NB-HMTB		44·0[1]	30	20	+ +?		Early experiments in oven.
2	NB-HMTB		44·0[1]	30	20	+ +?		
3	NB-HMTB		55·0[1]	40	30	000		
4	NB-HMTB		55·0[1]	30	20	???		
5	NB-HMTB	58·0	45·0	30	20	+??		Not enough cells.
6	NB-HMTB	64·0	51·0	30	20	+ +?		Not enough cells.
7	NB-HMTB	70·0	57·0	30	20	?00		
8	NB-HMTB	60·0	47·0	30	20	?? +		Too many cells.
9	NB-HMTB	62·0	49·0	30	20	+? +		
10	NB-HMTB	66·0	53·0	30	20	? + 0		
11	NB-HMTB	59·0	46·0	30	20	+ + +		
12	NB-HMTB	70·0	57·0	30	20	000		Too much hæmolysis.
13	NB-HMTB	70·0	57·0	30	20	000		
14	NB-HMTB	64·0	51·0	30	20	+ + +	+	
15	NB-HMTB	75·0	62·0	30	20	000	+	
16	NB-HMTB	67·0	54·0	20	10	0?0	+	Short period.
17	NB-HMTB	63·0	50·0	20	10	+ +?	?	
18	NB-HMTB	71·0	58·5	20	10	000	+	
19	NB-HMTB	63·0	50·0	20	10	+ + +		
20	NB-HMTB	67·0	54·0	20	10	?00	?	
21	NB-HMTB	71·0	58·5	20	10	000	+	
22	NB-HMTB	61·0	50·0	40	30	?? +	+	Long period. 11° C. lag allowed. See Figure II.
23	NB-HMTB	66·0	54·0	40	30	0?0	+	
24	NB-HMTB	69·0	58·0	40	30	000	+	
25	NB-HMTB	57·0	46·0	40	30	+ + +	+	
26	NB-HMTB	61·0	50·0	40	30	+? +		
27	NB-HMTB	65·0	54·0	40	30	00 +	+	
28	NB-HMTB	61·5	60·0	30	20	000	+	Unilateral blood sample. Water jacket added to tank cover.
29	NB-HMTB	59·5	58·0	30	20	?00	+	
30	NB-HMTB	55·5	54·0	30	20	+ + +		
31	NB-HMTB	51·5	50·0	30	20	+? +		
32	NB-HTTB		46·0[1]	30	20	—? —		Heterologous tumour blood and negative chemiotaxis.
33	NB-HTTB		46·0[1]	30	20	? — —	—	
34	NB-HTTB	51·5	50·0	30	20	—? —	—	
35	NB-HTTB	55·5	54·0	30	20	0? —	—	
36	NB-HTTB	59·5	58·0	30	20	00?	—	
37	NP-HTTP	51·5	50·0	30	20	— —		Heterologous tumour plasma.
38	NP-HTTP	55·5	54·0	30	20	000		
39	NP-HTTP	59·5	58·0	30	20	?00		
40	NP-HTTP	51·5	50·0	30	20	— — —		
41	NP-HTTP	63·5	62·0	30	20	000		
42	NP-HTTP	51·5	50·0	30	20	—? —		
43	NP-HTTP	56·5	54·0	30	20	?00		
44	NP-HTTP	59·5	58·0	30	20	0?0		
45	HNB-HTB	57·5	56·0	30	20	?00		Human blood.
46	HNB-HTB	49·5	48·0	30	20	? — —		
47	HNB-HTB	56·5	55·0	30	20	0?0		
48	HNB-HTB	50·5	49·0	30	20	— —?		
49	HNB-HTB	55·5	54·0	30	20	0 —?		
50	HNB-HTB	51·5	50·0	30	20	— — —		

[1] Approximate

A series of experiments were, therefore, carried out with plasma clots instead of blood. It was decided to use a second mouse for the tumour fragment, as the preparation of plasma requires all one's attention and the results belong to the heterologous series (HTTP in the table). The extremely rapid rate of clotting of mouse blood rendered the task difficult. Finally, the mouse was anæsthetized and then chilled in ice-water to retard clotting. Then the chest was opened, the vessels were cut, and the heart was removed. The chest cavity then filled with blood, which was transferred to paraffined centrifuge tubes by means of a paraffined pipette. The pipettes were chilled and the centrifuge tubes were enclosed in a jacket of cold brine. After being spun for about thirty seconds, the plasma was placed in the diffusion vessel with cold pipettes. The experiment then proceeded as before, and negative chemiotaxis was observed, whilst the temperature of inactivities was of the same order as for blood [Figure III (*g*)]. Thus the red corpuscles or hæmoglobin had not apparently interfered with previous results. Finally, samples of human blood were tested, four sets being obtained from a patient with advanced carcinoma of the rectum and two sets from one with an advanced carcinoma of the tongue. Fortunately the three low temperature experiments showed a reaction, because there does not appear to be any response in the case of some human cancers.[4] [6] The temperature of inactivation between 50° and 54° C. appears to be just the same as with mouse blood [Figure III (*h*)].

Discussion.

The fact that all the reactions cease after the blood, or plasma, is heated to a little over 50° C. suggests that proteins are involved. On the other hand migration takes place just as rapidly when normal and tumour blood is used as with two different salt concentrations. This would not be expected, as protein molecules diffuse slowly. Possibly the substances responsible for the cancer reaction are comparatively simple molecules with a high diffusion rate, but they are trapped by the coagulation of certain associated proteins when the above temperature is reached. Only future work can settle this point. The extraordinary difference between "homologous" mouse blood taken from the animal supplying the tumour fragment and "heterologous" blood from any other tumour-bearing animal was well demonstrated in this work, and it suggests, I think, a protein possibly related to an antibody.

Conclusions.

The selective migration of mouse tumour cells which takes place in the presence of mouse or human tumour blood and forms the basis of the Moppett test for cancer, is prevented when the specimens of blood are heated to a temperature between 50° and 54° C. for a period of twenty minutes.

Acknowledgements.

I wish to express my thanks to Dr. E. F. Thomson and the Cancer Research Committee of the University of Sydney for facilities for carrying out this work.

References.

(1) W. Moppett: "Chemiotaxis in Tissue Culture", THE MEDICAL JOURNAL OF AUSTRALIA, March 5, 1927, page 336.
(2) W. Moppett: "Observations on the Movement of Cells in Vitro", *Proceedings of the Royal Society*, Series B, Volume CVI, 1930, page 175.
(3) W. Moppett: "Observations on the Movement of Cells in Vitro with Reference to Tumour Immunity", THE MEDICAL JOURNAL OF AUSTRALIA, December 10, 1932, page 718.
(4) W. Moppett: "A Serological Test for Cancer", THE MEDICAL JOURNAL OF AUSTRALIA, May 26, 1934, page 681.
(5) W. Moppett: "A Serological Test for Cancer, Part II", *Journal of the Cancer Research Committee*, May 1, 1936, page 111.
(6) E. F. Thomson: "The Moppett Test for Cancer", *Journal of the Cancer Research Committee*, May 1, 1936, page 116.

Reports of Cases.

NEUROBLASTOMA OF THE ADRENAL, WITH MASSIVE METASTASES AND PURPURA.

By NORMAN CUST, M.B., B.S.,
Registrar, Children's Hospital, Melbourne.

Clinical History.

V.C., a well developed girl of four and a half years, was admitted to the Children's Hospital on September 8, 1936, She was the second child of the family, and had been quite well until three months previously, when bruises appeared on the face, followed closely by ecchymoses of both eyelids.

The parents recollected that she had sustained a fall two days previously, but the accident had not excited any anxiety at the time. A few weeks later, the bruises persisting, her appetite failed, she became pale and began to lose weight. Three weeks before her admission to hospital she was awakened by a brisk epistaxis, followed by a copious hæmatemesis, which ceased without special treatment. She was kept in bed, but three days later, on August 22, 1936, her left eye suddenly became prominent, and thereafter became progressively more so. At the same time another crop of bruises appeared, this time on the legs and over the nose. Four days later there was another epistaxis.

At this time there was noticed a prominence of the abdomen, which became more conspicuous in the two weeks which elapsed before the child's admission to hospital. There was no indication of hæmorrhage from any other orifices, and the child had not been subject to purpuric manifestations prior to the onset of this illness.

On examination the striking features were pronounced left-sided exophthalmos and the enormous size of the abdomen. The abdomen was uniformly rounded, bearing prominent blue veins on its surface; these points had, no doubt, suggested the diagnosis of tuberculous ascites, with which the child had been sent to hospital. They are well shown in the photograph (Figure I). The tension of the abdomen made palpation difficult, and the only feature which could be elicited was a sharp, firm lower edge resting on the *symphysis pubis*. This was considererd to be liver or spleen. The whole abdomen was uniformly dull to percussion, dulness reaching as high as the nipples in each axilla. A few moist sounds were heard at the base of each lung, but there was no clinical evidence of consolidation. The heart sounds were clear. There was no enlargement of any of the subcutaneous lymphatic glands.

The skin was sallow, with some wasting of the subcutanea, and there was a bruise on the left leg. There was ecchymosis of the upper lids of both eyes. The left eye, in addition, showed a marked proptosis, so that the lids could not be closed. Movements of the eyeball were restricted and ulceration of the cornea was present.

Blood examination revealed a severe anæmia, but no distinctive features. Erythrocytes numbered 1,750,000 per cubic millimetre, the hæmoglobin value being 42% (Sahli-Hellige). There were very few distorted forms, but reticulocytes represented 5·6% of the red count. White blood cells numbered 12,000 per cubic millimetre, the

differential count being normal. The platelet count was reduced to 40,000 per cubic millimetre. Coagulation and bleeding times were within normal limits. The blood serum did not react to either the Van den Bergh or the Fouchet tests. The corpuscular fragility test resulted in a normal finding, hæmolysis commencing at 0·45% saline solution.

Ophthalmoscopic examination showed the vitreous humour in the left eye to be "hazy", but there were no retinal hæmorrhages nor papilœdema. X ray examination of the chest revealed elevation of the right dome of the diaphragm, which appeared to be the result of an intraabdominal abnormality. No abnormality was detected in the lungs. No lesion was detected on X ray examination of the skull.

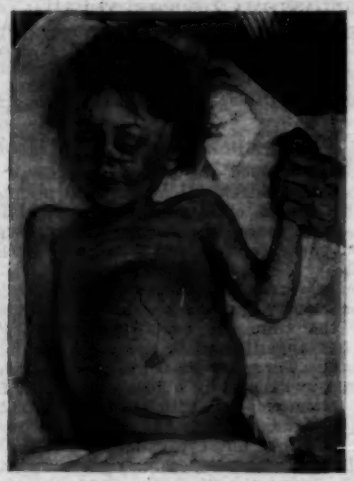

FIGURE I.
Showing exophthalmos and wasting, with lower edge of liver marked on abdomen.

On September 10, 1936, the left eyelids were sutured to maintain closure, and it was decided to treat the child for the anæmia. One injection of "Campolon", four cubic centimetres, was given intramuscularly. "Clauden", 0·5 gramme, was given twice a day, and one tablet of "Protomin" was given twice a day. Two transfusions of citrated blood were given, one of 250 cubic centimetres (eight ounces) and one of 200 cubic centimetres (six and a half ounces); these raised the hæmoglobin value to 67% on September 14, 1936. Five days later, in the absence of any external hæmorrhage, the hæmoglobin had fallen to 40%.

At this time the abdomen was observed to be increasing in size still further, and orthopnœa became apparent. Corneal ulceration progressed despite attention, and the child quietly succumbed a week later, less than four months from the onset of the first symptom. A moderate amount of fever was present throughout.

Post Mortem Findings.

When the abdomen was opened the huge liver presented itself, occupying the whole anterior aspect of the abdomen; no bowel was visible (see Figure II). The surface of the liver was smooth, the lower edge being firm and sharp, and exhibited a well-marked notch between the right and left lobes. The colour was pale, but finely mottled with darker red areas.

The liver was removed *en bloc* with the right kidney. It was then found that a red, fleshy tumour, twice the size of the child's kidney, occupied the site of the right suprarenal body, merging insensibly into and infiltrating the bare area of the right lobe of the liver. The right kidney was displaced downwards, but was clearly demarcated from the tumour. Adjacent glands were hæmorrhagic and enlarged. The left kidney, left suprarenal body and spleen were all normal in size and appearance. The bowel was not involved and the heart was normal. There was some congestion at the base of each lung, but no metastases were observed. The mediastinum was clear except for a small fleshy mass attached to the under side of the sternum.

Section of the brain and an inspection of the inner and outer aspects of the skull failed to disclose any intracranial secondary deposits, but on removing the roofs of the orbits hæmorrhagic metastases were found in each orbital fossa.

Microscopically the primary growth is a typical example of neuroblastoma. The cells are arranged in alveolar masses, separated by a fibrous stroma, richly supplied with blood vessels. Under high power deeply staining small round cells are closely packed in a fibrillar stroma, and "rosette" forms are plentiful, consisting of a circle of small round cells surrounding a well-defined core of fibrils. Two such rosettes are well shown in the accompanying photomicrograph (Figure III).

Examination of the cut surface of the liver failed to show any discrete secondary masses, but merely a mottling, suggesting a fine, diffuse invasion. This was borne out by the microscopic picture, where liver architecture was completely lost, being replaced by irregular masses of tumour cells. In between these masses of tumour are isolated short columns of compressed liver cells, but portal areas and bile ducts are difficult to identify.

The orbital deposits are microscopically similar to the primary tumour, but rosettes were not encountered, while areas of hæmorrhage were freely distributed.

FIGURE II.
Photograph at *post mortem* examination, showing the size of the liver.

Comment.

The microscopical picture conforms to that of neuroblastoma of the adrenal, the commonest retroperitoneal tumour at this age. The clinical features would classify it as a combination of Hutchinson's and Pepper's types, as the early appearance of orbital ecchymoses is typical of the Hutchinson's syndrome, whereas the massive liver involvement is more properly a feature of the Pepper type.

Boyd[1] noticed that in all collected cases of right-sided adrenal tumour the orbital metastasis occurred first on the right side. In this case onset was with simultaneous ecchymosis in both eyes, although the proptosis occurred only in the left eye. The latter was probably due not

ILLUSTRATIONS TO THE ARTICLE BY DR. NORMAN CUST.

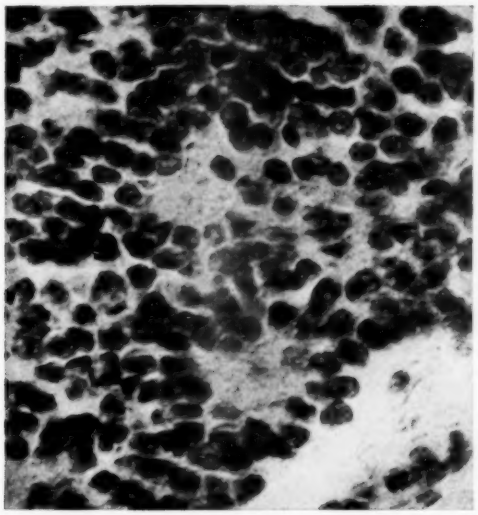

FIGURE III.
High-power photomicrograph of the primary tumour.

ILLUSTRATIONS TO THE ARTICLE BY DR. H. W. WUNDERLY.

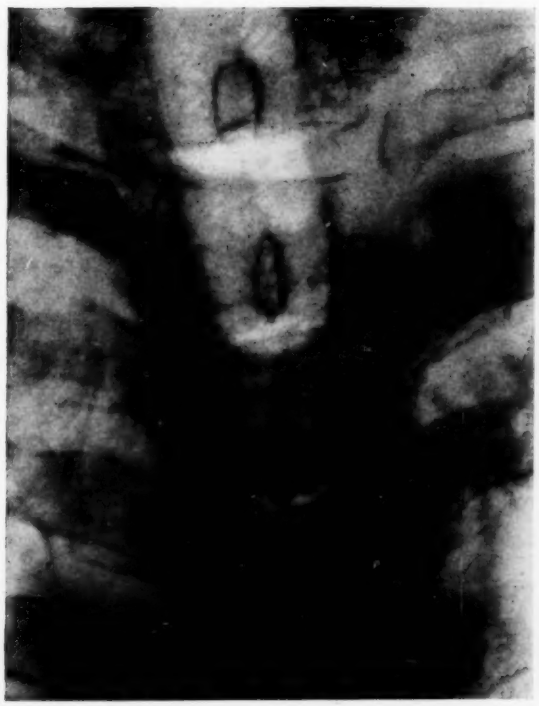

FIGURE I.

This shows the body of the second dorsal vertebra narrowed and rarefied on the right side, with upward displacement of the posterior end of the second right rib and the transverse process.

FIGURE II.

After a course of deep X ray therapy there is evidence of bone regeneration. The structure of the right upper border of the second dorsal vertebra now shows a definite edge in place of the former moth-eaten appearance.

so much to earlier deposit in the left orbit as to hæmorrhage into existing deposits.

The diffuse invasion of the liver and its rapid and massive growth under observation suggest a blood-borne invasion by erosion of the portal vein, which, indeed, was embedded in the primary tumour.

The purpuric phenomena were probably due to vascular endothelial damage with thrombocytopenia, the result of cachexia, as an examination of the bone marrow failed to disclose any malignant deposits.

Acknowledgement.

I am indebted to Dr. I. J. Wood for permission to publish the history of this patient who was under his care.

Reference.

(1) W. Boyd: "Pathology of Internal Diseases", 1935, page 490.

TWO CASES OF GIANT-CELL TUMOUR.

By H. W. WUNDERLY, M.D., M.R.C.P.,

Honorary Assistant Pathologist, Adelaide Hospital; Honorary Assistant Physician, Tuberculosis Service, Adelaide Hospital; Honorary Physician, Bedford Park Sanatorium.

Case I.

Mrs. M., aged fifty-one years, presented herself for examination early in February, 1933. She complained of weakness, numbness and stiffness in the upper part of the right leg. These had been present for some months and had gradually been getting worse.

Many years before she had been operated on twice for ovarian cysts, and when quite young had pleurisy with effusion. Lately there had been some pain behind the right sacro-iliac joint, and on several occasions the right leg had given way under her. On examination there was a swelling in the right iliac fossa, which continued below Poupart's ligament into the upper part of the thigh, where it was external to the vessels. This swelling was fluctuant. There was some tenderness over the lower thoracic spines, but no limitation in movement, and there was no shortening of the right leg. X ray examination revealed no abnormality of the right sacro-iliac joint, of the right hip joint nor of any of the lower thoracic and lumbar vertebræ.

Mr. L. C. E. Lindon, towards the end of February, made an incision over the swelling below Poupart's ligament and came on what looked like a cyst partly filled with old blood clot. This cyst was in amongst the muscles, and the walls of the cyst were stained yellow. Mr. Lindon's opinion was that it was an intramuscular xanthoma. This was confirmed by the report of the pathologist. As soon as the wound was healed, deep X ray therapy was instituted and the patient made a complete recovery. Three months after the operation no mass was palpable.

Case II.

On June 25, 1934, J.O.B., aged forty years, reported that five weeks previously, when cranking a motor-car, his hand slipped off the starting handle and he fell heavily onto the dumb-iron of the motor-car. He noticed a kind of rick near the backbone, very high up. There was a very sharp pain at the site of the rick, and later this travelled down his arm. His back remained painful, but the arm hurt only occasionally. He noticed that the pain in his back disappeared when he lay down, but that it came on again when he got up. He was able to continue with his work for two weeks after the accident, when he had to spend a day in bed owing to the pain in his back. He called in his local doctor, who applied diathermy to his upper spine. Later he had some trouble in getting out of his bath, and on June 22 he noticed that the fronts of his legs were "sleepy" and that he was weak in his legs. He had also noticed the same "sleepy" feeling in a girdle around the middle of his abdomen. He had no trouble with his bladder or bowels, except that he needed small doses of aperient. After a motor journey of seventy odd miles he noticed that his legs were very much weaker and that he felt sick when he tried to stand up.

There was nothing of importance in his previous history. Fourteen years ago he had had diphtheria, and eight months ago he was in bed with a feverish attack, which he thought was influenzal in nature. He had been advised to have his teeth examined by X rays, and after this they were removed. Until the accident he had felt well since then.

The patient had to be almost carried in from his motor-car, for his legs were not able to support him. It was noticed that his left palpebral fissure was wider than the right and that his left pupil was very dilated. Both pupils reacted readily to light and accommodation, and all the eye movements were good. The knee and *tendo Achillis* jerks were equal and active, and there was a tendency to clonus on both sides. It was not possible to elicit plantar reflexes, and the superficial abdominal and cremasteric reflexes were absent on both sides. The sensation to pin prick and cotton wool was impaired six inches above and just below the right and left Poupart's ligaments. The grip of the right hand was much weaker than that of the left.

The X ray photograph of his thoracic spine revealed narrowing and rarefaction of the right side of the second thoracic vertebra. The posterior end of the second rib and the transverse process were displaced upwards. The report stated that the appearance strongly suggested a fracture, probably pathological, and that it might be a metastatic deposit of carcinoma.

He was admitted to hospital and it was noticed that he did have some difficulty with micturition and that he could not dorsiflex his right foot. After two days of complete rest in bed he stated that the sensation over the lower part of his abdomen was not so "indefinite" and he was able to move his right big toe, which he was unable to do on his admission to hospital.

On June 29, four days after his admission, it was possible to obtain a definite extensor plantar response on the right side. Although sensation had improved on the right side, there was still an area corresponding to that supplied by the twelfth left thoracic and first lumbar segments, over which the sensation was still impaired. Since lying flat on his back, he complained of pain down both arms as far as the elbows.

Until July 4 he was not able to pass his urine, and his bladder had to be catheterized. He was not able to flex the right ankle, but power to contract the right gluteal region improved. The knee and ankle jerks were equal and active, the superficial abdominal reflexes were absent, and there was diminished sensation below the area supplied by the second left thoracic segment. He stated that the upper part of his right arm felt as though a tight band were tied around it. The Wassermann test of his blood gave no reaction. He was seen in consultation by Mr. Leonard Lindon, and we decided that a laminectomy was necessary. On July 2 he vomited quite a quantity of digested blood; but this did not happen again. He had had no abdominal pain, nor was there any history of chronic indigestion.

On July 10 Mr. Lindon performed a laminectomy, or, as he described it, "an operation as for right second costo-transversectomy". The tumour proved to be very vascular and semi-encapsulated. Some areas were yellowish and some were quite pink. There were some pieces of hard bone and some tissue which looked like blood clot.

The pathologist's report on this tissue was that there was no evidence of newgrowth and that the tissue did not suggest Hodgkin's disease, leuchæmia or tuberculosis. The most obvious thing about the section was the large number of giant cells which contained many nuclei, mostly towards the centre of the cells.

Within a week of the operation there was some recovery of the right leg. There was still a double ankle clonus with exaggerated jerks; but some return of the superficial abdominal reflexes was noted. The left pupil was still very large and the grip in the right hand weak; the right arm felt numb.

Without knowing the nature of the pathological process, it was decided to give a course of deep X ray therapy. This was completed by August 21. Photographs were taken of the spine on September 4, and these showed definite bone regeneration. By early November the patient was able to walk with the aid of a stick, and the sensory changes on the left side of the thorax and the skin below had entirely disappeared. The plantar reflexes on both sides were flexor and there was good voluntary movement of the right foot.

Comment.

The radiological appearance of a giant-cell tumour of a long bone is usually most characteristic. The expanded bony shell of the tumour is very thin and the pictures of these tumours emphasize their destructive character. In a majority of cases this bony shell is soon perforated. The lesion is situated asymmetrically within the cortex and it appears to "blow out" or expand the cortical tissue. Within the tumour the shaft of the bone is absent, while beyond the tumour the cortex and the periosteum are entirely unaffected, and no periosteal lipping is seen. In a good photograph an apparent continuation of the bone shell is seen limiting the tumour from the adjoining unaffected medullary cavity. The tumour extends up to the articular cartilage, but rarely perforates it.

In osteogenic sarcoma the tumour does not reach the articular cartilage and one can usually see the shaft running in the substance of the tumour.

Trabeculæ traverse the diameters of the tumour when the shell of bone is intact, but as the tumour becomes larger, the trabeculæ and then the bone shell disappear, the tumour extending into the soft parts. In even relatively advanced lesions there is no periosteal reaction.

The adult age of the patient and the involvement of the epiphysis are important aids to differential diagnosis. Metastatic lesions are usually situated in the shaft of the bone near the nutrient vessels and not in the epiphysis, and they do not show the same tendency to expand the bone.

In giant-cell tumours of the vertebræ the intervertebral disk is not involved till very late, if at all; the condition thus differs from Pott's disease, in which the intervertebral body is involved quite early.

Geschickter and Copeland,[5] writing on *osteitis fibrosa* and giant-cell tumour, express the view that the giant-cell tumour arises as an abnormal phase in the osteoclastic resorption of cartilaginous or temporary bone. In discussing xanthoma they state that this view "demonstrates its usefulness when applied to the pathologic changes in the giant-cell tumours of the xanthoma group". On histological grounds they rejected the theory that these tumours were formed of granulation tissue, and they found it was necessary for them to demonstrate a connexion between them and some bony or cartilaginous structure. They had in their material a giant-cell tumour of the patella, and Cole had reviewed seven such tumours of the patella recorded as variants of either the bone cyst or giant-cell tumour. They noticed a similarity in the microscopic appearance of these tumours of the patella and of the giant-cell tumours of the tendon sheaths. They write:

> Still more important is the fact that the location of these tumours resembles the site of origin of similar tumours in the xanthoma group, in that the patella is embedded in a tendon, being a true sesamoid bone derived from cartilage.

From a study of the sites of these tumours and of their histological structure they were convinced that these tumours of tendon sheaths occurred in sesamoid bones. They write:

> Where these xanthic tendon sheath tumours do not occupy the site of sesamoid bones, the microscopic reports show that they do not have the typical giant-cell structures and that they belong more properly to the fibro-hemangiomas, fibromas or ganglion class.
>
> The most convincing evidence that the sesamoid bones are the source of origin of these growths, however, is presented by the histology of the tumours themselves, for some vestige of the original structure of the sesamoid bones is usually visible under the microscope. Special study on this point reveals the fact that the pink-staining network of tissue observed in the sections is the remains of white fibro-cartilage from which tissue the sesamoid bones are known to be derived. The presence of this stroma containing cartilage cells confirms the origin of these tumours from the sesamoid bones. In several cases the calcification of this cartilage and transformation to bone were observed in the section.

And so they stated that the giant cell tumours of tendon sheaths which had long been classed under the heading of xanthoma were in reality tumours of sesamoid bones. The most frequent situations for sesamoid bones are, according to Pfitzner,[3] on the first, second and fifth digits of the hand and foot at the metacarpo- or metatarso-phalangeal joints. Other but more unusual sites are in the tendons about the elbows, knees or ankles, or in the tendon of the psoas muscle at the pubis. This, I suggest, was the origin of the first growth reported in this paper, which was really a giant-cell tumour of a sesamoid bone in the tendon of the psoas, and not a true xanthoma.

The situation of these two tumours is sufficiently rare to justify their publication. In 1924, Dean Lewis[6] reviewed sixteen cases and also reported one of his own, the tumour being a giant-cell tumour of the vertebræ. Bower, Clarke and Davis[4] in 1930 reviewed 28 cases which had been reported in the literature. The average age of the patients was 22·2 years. Trauma was mentioned as a causative factor in a third of the cases. Pain was severe at the site of the lesion in 55·5% and was referred in 33·3%. Paralysis of the lower extremities was present in 26% and weakness in 18%. A mass was visible in 75% and kyphosis in 18%. Although Dean Lewis reported that there had been no metastases and only two recurrences in the cases he investigated, these three authors found that there was a definite history of recurrence in eleven out of seventeen cases in which they were able to trace the patients, and doubtful metastases in two. In this series four lines of treatment had been followed: (i) operation; (ii) operation *plus* radium; (iii) the application of radium alone; (iv) Coley's fluid alone was used in seven cases. The history of their patient was somewhat similar to the one that I have reported, in that the trauma was transmitted to the spine through the outstretched arm. Their patient was a girl, aged seventeen years, who, when walking downstairs, slipped and, in order to regain her balance, threw her shoulder back. This produced a sharp pain in the region of the left lumbar spine, and a lump appeared two weeks later. Three years later it was noticed that the left leg was smaller than the right. The subsequent history was that five years and one month after the onset of symptoms, and five years after the implantation of radium, the patient was in good health.

In 1928 Adson[2] reported two cases of what he called *osteitis fibrosa cystica* of the spine. He stated:

> My reason for reporting the following cases of *osteitis fibrosa cystica* of the spine is to emphasize the fact that the disease occurs in other than long bones of the body, that trauma and infection are suggestive ætiological factors, and that roentgenograms are of diagnostic value in differentiating bony tumours, and to call further attention to the value of surgical treatment in these benign giant cell tumours.

His patients were treated by curettage and deep X ray therapy.

Also in 1930 José V. Santos[8] described a patient of his in whom there was destruction of the body of the first lumbar vertebra with crushing and resultant anterior angulation of the spinal column. The left transverse process and the left root of the vertebral arch were also destroyed. The chief complaint was of pain in the back and of incontinence and constipation.

Lindsay and Crosbie[7] reported the case of a child six years old, who had a giant-cell tumour involving the second cervical vertebra, and both MacFarlane and Linell,[9] in *The British Journal of Surgery*, and Henry Milch,[10] in

the *American Journal of Cancer*, reported cases in which the third cervical vertebra was involved. In only one case besides the one I am reporting could I find the second thoracic vertebra affected.

At operation there is found a shell of bone which is very friable and inside which is a mass of soft, friable tissue, sometimes dark red, like blood clot, at other times greyish, and often associated with old or recent hæmorrhage. The cavity of the tumour may be divided into many loculi. There is usually a tendency for this extremely friable tissue to bleed as soon as it is touched. What the surgeon mistook for a partial capsule was the remains of the thin shell of bone which had been fractured, and the rib became displaced when the patient slipped in trying to crank his motor-car. A similar accident happened to the patient reported on by MacFarlane and Linell. The evening before they saw their patient, he had been cranking the engine of his motor-car, when it backfired. Immediately he was conscious of pain in his neck and shoulders. X ray examination revealed a compression fracture of the body of the third cervical vertebra. Eight months later he died. Fragments of necrotic tissue were scooped out from between the second and fourth cervical vertebral bodies. Scattered through the tumour were large numbers of multinucleated foreign body giant cells. The matrix of the tumour consisted of fusiform cells, of which the nuclei were oval, and as a rule showed light chromatin content.

Geschickter and Copeland,[13] in their book on tumours of bone, discuss the relation of the histogenesis of intracartilaginous ossification to giant-cell tumour.

> These embryologic studies emphasize the association of the giant cells with the perforation of new perichondral bone and the resorption of calcified cartilage. The specimens show clearly that the giant cell proceeds inwardly from outside the shaft of the bone and that these multinucleated elements may arise in the primitive periosteal tissue. It is not necessary to assume that they arise from the marrow reticulum, as many histologists believe, nor that they are derived from the endothelium of capillaries. The only distinct evidence is in favour of the view that they are formed from primitive mesenchyme and that such mesenchyme exists periosteally.

They maintain that:

> In both giant-cell tumour and *osteitis fibrosa* . . . the giant cells in these lesions retain the same histologic function as the osteoclasts seen in human and other mammalian embryos.

From their observations they conclude that:

> The giant-cell tumour and the related lesion of bone cyst are the result of an abnormal hyperplasia of osteoclasts preceded by a normal stage, in which osteoclastic proliferation is taking place as a phase in the histogenesis of intracartilaginous bone. From this point of view, the term progressive osteoclasia is suggested for the process underlying the giant-cell tumour and the term regressive osteoclasia for bone cysts.

In discussing the ætiology of giant-cell tumour, these authors are of the opinion that trauma to the cortex in the region of the epiphysis interrupts the periosteal blood supply.

> Normal vascular channels are thus supplanted by a subperiosteal hæmatoma. Interruption of the periosteal blood supply renders inactive the cortical bone on this side of the epiphyseal end, and its normal healing powers are suspended. The medullary circulation in the region of the epiphysis must take on an increased activity and by establishing new channels work its way round the injured area to undertake the work of repair.
>
> This increased function of the medullary blood supply during the interruption of the periosteal circulation can take place only after osteoclasts have opened up the channels in bone for the budding capillaries . . . The defensive reaction of cortical bone, therefore, is suspended while bone destruction by osteoclasts is at its height. This imbalance results in hyperplasia of the osteoclasts and produces a tissue characteristic of giant-cell tumour and the early phase of *osteitis fibrosa* or bone cysts.

Henry Milch,[20] who reported an expansile tumour of the spinous process of the third cervical vertebra, in discussing giant-cell tumours of the vertebral column makes the following observations:

> It is interesting to observe that these tumours have been described as arising in the body, the spine and the transverse processes, *i.e.*, in those places where muscular attachments normally occur, but never in the pedicles nor the laminæ. Indeed, the very attachment of the muscles has been considered as mediating the trauma to which some attribute the origin of these tumours. Where the pedicles or laminæ are involved, it is apparently only by extension of the disease process.

This does not altogether agree with the findings of Dean Lewis,[21] who investigated seventeen cases and found that the most frequent site of giant-cell tumours was in the region of the laminæ in the body, in the transverse process or in the lamina itself. As pointed out by Geschickter and Copeland, this brings the tumour into contact with compact bone at an early stage.

The question whether a giant cell tumour is a true blastoma or merely an inflammatory process divides investigators into two classes. Anatole Kolodny[22] in 1919 stated:

> To one [class] belong those who look upon it as a true blastoma; the others see in it merely a product of inflammation and repair. In recent years the balance of opinion has inclined towards the latter view. However, there is not sufficient evidence to support a contention that in ALL cases of giant-cell tumour the lesion is a product of inflammation and repair.

Mallory has long maintained that the giant cells of the giant-cell tumour are

> not an integral part of the lesion, but only a biological reaction of the large mononuclears of the blood, the so-called endothelial leucocytes, which are found wherever retrograde changes are going on . . . Aside from these giant cells no cells occur in these lesions which are not met with in ordinary inflammatory processes.

Of the same opinion is Codman, who sees in the giant cell tumour a repair process following intraosseous hæmorrhages due to rupture of nutrient vessels. In Codman's opinion the tendency of this disease to form large expansile tumours does not warrant considering it as a neoplasm any more than does the enlargement of an aneurysm.

Lubarsch and Konjetzny, quoted by Kolodny, regard giant-cell tumours as merely a "chronic resorptive process". Years ago Lubarsch pointed out that the new growths observed in the course of *osteitis fibrosa* were purely inflammatory. Later he joined Konjetzny in the latter's interpretation of results obtained from special studies of giant-cell tumours. These results showed how

> an intramedullary hæmorrhage calls forth a reactive proliferative process. The product of this proliferative process of the bone marrow, which can be compared to granulation tissue, consists histologically of all the elements encountered in lesions known as giant-cell tumours.

Nature of the Giant Cells.

According to Kolodny[22] there are three types of giant cells:

1. The giant cells, which are the result of karyorrhexis in the cellular elements of the tumour. This is especially frequently observed in rapidly growing malignant tumours, where the division of the cytoplasm cannot keep pace with the closely following repeated divisions of the nucleus. The nuclei here are of various sizes and shapes, and frequently are not separated from each other. Following the lead of Mallory, these are spoken of as true tumour giant cells.

2. Foreign body giant cells. These occur in tuberculosis and in gummata; they are the Langhans type of giant cells with a peripheral or bipolar arrangement of their nuclei.

3. Giant cells of the giant cell tumour. The nuclei are uniformly distributed throughout the central portion of the cell; they are of equal size and are completely separated from one another.

The origin of these giant cells of the giant cell tumour is still not settled. Some, like Geschickter and Copeland, look on them as periosteal in origin, while Lubarsch regards them as abortive vascular sprouts, and others see in them fused endothelial cells. Nor do all pathologists see any difference between these giant cells and the "foreign body" giant cell of the Langhans type.

From the point of view of prognosis the cells of the stroma are of more importance than the giant cells. Kolodny[11] states that an increase in the hyperchromatism of the stroma cells is a warning of the possibility of a recurrence following an incomplete surgical operation. Also he considers a guarded prognosis should be given in the case of a very vascular giant cell tumour, which is usually more aggressive. A further increase in aggressiveness is indicated by a disappearance of the giant cells and by an increase in the number of spindle cells in the stroma.

Treatment.

It was more by good luck than good management that the treatment in the two cases herein reported happened to be correct. In neither case did the report from the pathologist settle the diagnosis of the nature of the tumour, but both reports mentioned the presence of numbers of giant cells. Both operations were exploratory and no definite attempt was made to eradicate the tumour.

Geschickter[10] is of the opinion that there are three groups of giant-cell tumours in which irradiation is better than surgery.

1. The bone cyst on the shaft side of the epiphyseal line, with a short duration of symptoms, in young individuals may contain a great deal of giant-cell tumour tissue. This is the so-called giant-cell variant of the bone cyst.
2. In the second group the patients are usually elderly, the tumour is seen relatively late, and there is pronounced destruction of the bone. Irradiation should be tried first and surgery remains as a second choice.
3. When the tumour is located in the spine, particularly in the lumbar or cervical region or in the skull in the region of the temporal fossa, irradiation is preferable to surgery.

He gives a further three groups in which surgery is preferable to irradiation.

1. If the bone involved by the tumour is not essential to the function of the limb.
2. When the patient is middle-aged and in whom the function of the limb is vital to their occupation and livelihood. Irradiation is far slower in its effects and disables these patients for too long a time.
3. In cases in which the initial treatment has been given elsewhere and where, because of inadequate excision, incision or irradiation, there is recurrence. Irradiation in such secondary cases rarely secures a good result.

Finally, in further support of the advantages of surgical removal, it must be remembered that biopsy makes a correct diagnosis of the nature of the tumour much more certain, it enables one to give a more reliable prognosis, as the nature of the predominant cell is known, and the results of thorough resection are better than those of irradiation.

References.

(1) Geschickter and Copeland: "Osteitis Fibrosa and Giant-Cell Tumour", *Archives of Surgery*, Volume XIX, August, 1929, page 280.
(2) W. Pfitzner: Quoted by Geschickter and Copeland.
(3) Dean Lewis: "Primary Giant-Cell Tumour of Vertebra", *The Journal of the American Medical Association*, Volume LXXXIII, 1924, page 1224.
(4) Bower, Clarke and Davis: "Management of Giant-Cell Sarcoma of the Vertebra", *Archives of Surgery*, Volume XXI, 1930, page 313.
(5) A. W. Adson: "Osteitis Fibrosa Cystica of the Spine", *Surgery, Gynecology and Obstetrics*, Volume XLVI, 1928, page 654.
(6) José V. Santos: "Giant-Cell Tumour of the Spine", *Annals of Surgery*, Volume XCI, 1930, page 37.
(7) Lindsay and Crosbie: "Giant-Cell Tumour of the Second Cervical Vertebra", *Journal of Bone and Joint Surgery*, Volume XV, 1933, page 702.
(8) MacFarlane and Linell: "Giant-Cell Tumour of the Third Cervical Vertebra", *The British Journal of Surgery*, Volume XXI, 1934, page 313.
(9) Henry Milch: "Giant-Cell Tumour of the Spine", *American Journal of Cancer*, Volume XXI, 1934, page 363.
(10) Geschickter and Copeland: "Tumours of Bones", 1936, page 307.
(11) Anatole Kolodny: "Giant-Cell Tumours", *The Cancer Review*, Volume IV, Number 1, 1929, page 1.
(12) Anatole Kolodny: "Bone Sarcoma", *Surgery, Gynecology and Obstetrics*, Supplement 1, 1927.
(13) Chas. Geschickter: "Treatment of Giant-Cell Tumours of Long Bones", *The Journal of Bone and Joint Surgery*, Volume XVII, 1935, page 550.

Reviews.

MEDICINE IN THE WARDS.

JUDGED from the frequency of the issue of new editions, Savill's "System of Clinical Medicine"[1] must hold a place of high popularity. The first edition of this excellent book appeared in 1905. The edition now reviewed is the tenth, and it was issued in 1936. During the thirty years of the book's existence, reprinting of various editions has been called for on eight occasions. Surely few text-books have been so greatly in demand.

The book differs from most medical text-books in that it approaches medicine from the point of view of symptomatology. The doctor has to deal with a patient who complains of certain symptoms of disease. The cause has to be sought. Each case is a problem, great or small. The writers of the book follow the clinical method, pursuing the line of thought taken by the physician as he endeavours to solve the problem and form his diagnosis.

Dr. Agnes Savill states in the preface that the aid of seventeen specialists was sought for revising sections dealing with their particular domain. The list of the contributors shows them to be men of high eminence, holding senior hospital posts, mainly in London. They have done their work well. The book presents a well-planned and well-written survey of present-day clinical medicine. House physicians and clinical clerks should find such a book extremely valuable in assisting them to elucidate their everyday difficulties in diagnosis and treatment.

Although recent years continue to show steady increase in what may be termed laboratory medicine—the use of special methods of investigation—yet no wise practitioner in medicine will deny the paramount importance of sound clinical work.

It has been realized at last that there is such a thing as clinical science and that it is indeed the most fascinating aspect of modern medicine. What medical practitioner can survey the miracles of the liver treatment of pernicious anæmia or the insulin treatment of diabetes and not be filled with awe and enthusiasm? Clinical science is ever progressive. Hand in hand with experimental pathology, bacteriology, biological chemistry and radiology, it presses steadily on to the goal of sound medical practice. Each fresh edition of Savill's book marks further gains in the war on disease and outlines a sound clinical basis for continued attack.

[1] "A System of Clinical Medicine, Dealing with the Diagnosis, Prognosis and Treatment of Disease for Students and Practitioners, by T. D. Savill, M.D., edited by A. Savill, M.D., and E. C. Warner, M.D., F.R.C.P.; Tenth Edition; 1936. London: Edward Arnold and Company. Royal 8vo. pp. 1142, with illustrations. Price: 25s. net.

The Medical Journal of Australia

SATURDAY, JULY 10, 1937.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

EPIDEMIC INFLUENZA.

THE disease known as epidemic influenza has for many years provided for the epidemiologist a most fascinating and difficult problem. It has with justification been described as "the reigning killing disease of adult life". If the ravages of epidemic influenza for the last sixty years are plotted in a graph such as appears in the report for 1935 of the Director-General of Public Health of New South Wales, two peaks will be noted. One sharp rise occurred in 1891 and another, a great deal higher, in 1918-1919. It has been estimated that the pandemic of 1918-1919 destroyed more lives than were lost by the four years' conflict of the Great War. If the history of epidemics repeats itself, we may expect a recrudescence of this pestilence in seven or eight years' time. This is surely a challenge to medical research workers who are making efforts to find some effective method of prophylaxis.

Topley and Wilson, in their book on bacteriology and immunity, point out that the epidemiological study of this condition has been made unusually difficult by the lack of precision in clinical diagnosis. Diagnosis is easy in the presence of an epidemic; but sporadic cases or even minor outbreaks of acute febrile disease are often labelled influenza without justification—there is in fact no more popular dumping ground than "influenza". There is no clinical syndrome that justifies the diagnosis of influenza; and the difficulty of diagnosis will remain until the clinician and the bacteriologist by their combined efforts provide us with means of making a diagnosis in isolated cases. In the present state of knowledge nothing but historical interest is attached to the controversy as to whether epidemic influenza was or was not caused by *Hæmophilus influenzæ*, described by Pfeiffer in 1892. That the condition is due to infection by a virus may be accepted without question. In these circumstances it would make for clinical accuracy if the word influenza could be dropped altogether and if some other name could be substituted that would suggest an origin from virus infection and that would not be so likely to be used as a cloak for ignorance. That influenza was caused by a virus was accepted as a working hypothesis before the problem was attacked by Laidlaw and his co-workers. The investigations of Shope pointed the way to the work that was afterwards carried out by Laidlaw and his colleagues. Shope carried out important investigations in swine influenza, a disease that was first recognized in the United States of America in the autumn of 1918. Shope showed that the swine disease in its characteristic form was caused by the combined action of a filtrable virus and a hæmophilic bacillus, closely resembling the *Hæmophilus influenzæ* of human infections. In 1933 Laidlaw, Andrewes and Smith showed that a characteristic febrile disease could be induced in ferrets by the intranasal instillation of filtered nasal washings from human beings infected by epidemic influenza. The disease could be transmitted from one ferret to another; it was found, moreover, that ferrets that had recently recovered from the disease were resistant to reinfection and that their serum contained protective antibodies in high concentration. Laidlaw and his colleagues linked up their work with that of Shope,

for they noted that Shope's swine influenza produced in ferrets a disease that could not be distinguished from that produced by the human virus. In the report of the Medical Research Council of Great Britain for 1935-1936 this work is well summarized. It is pointed out that the virus originally isolated and identified at the National Institute for Medical Research, London, is diffused throughout the world. Special attention is drawn to strains sent from Australia by F. M. Burnet, from the Institute of Preventive Medicine of Holland and from the Pasteur Institute in Leningrad; these were found to be identical in all respects with the strains of influenzal virus examined up to that time. Although the evidence was strong that the virus propagated in the ferret was the cause of epidemic influenza in man, it was not complete. It was possible that the virus which infected the ferret might be a regular or frequent concomitant of influenzal infection in man, but not a cause of it. It was also possible that the naso-pharyngeal secretion of the influenza patient might contain something capable of arousing virulence in a virus normally present in a relatively innocuous form in the throat and nose of the ferret. Attempts to transmit the infection to human volunteers were unsuccessful, but accident effected what deliberate planning could not produce. Virus which was originally obtained from a human patient, but which had since been passed through 196 ferrets in series, was used to infect a small batch of ferrets. One of these, when heavily infected, sneezed violently at close range while it was being examined by Dr. Stuart-Harris. A typical attack of influenza followed, and washings obtained from the patient's naso-pharynx were infective to ferrets and to mice. By a stroke of good fortune a sample of Dr. Stuart-Harris's blood serum, taken before the attack, was available; this was found to contain no demonstrable antibody for the virus of human influenza. Antibody, however, began to appear early in the course of the attack; by the eighth day after infection, when symptoms had completely subsided, antibody was strongly developed; it was still more strongly developed on the sixteenth and thirty-first days, and after this it underwent a slow decline.

The important question that remains is the possibility of immunizing man against influenza. The present position is clearly set out in the Medical Research Council's report. Here it is stated that suitable application of a virus extracted from infected mouse lung or from a culture on chicken embryo will evoke the specific neutralizing antibody in the blood of a human subject or will produce an increase in any antibody that may be present. It remains uncertain, however, whether the amount of circulating antibody thus produced will confer a significant degree of resistance to naturally acquired infection; and "even if the use of a vaccine should be found to produce such resistance as an immediate effect, further evidence as to the persistence of the protective action will be required for any assessment of the practical value of the method". The caution in this statement is most commendable; but in view of the recent rapid additions to knowledge we are justified in believing that the complete solution of the problem is not very far distant.

Current Comment.

TORULOSIS IN MAN.

REFERENCES have been made from time to time in these pages to infections by some of the pathogenic yeasts and similar fungi. The torulæ can under certain conditions become pathogenic; they have been found in sputum of numbers of patients with chronic bronchitis, but in this case it cannot certainly be said that their presence is always of pathological significance. The actual technical differences between the torulæ and other parasitic fungi do not concern us here so greatly as the importance of the recognition of this type of infection. The total number of cases of torulosis reported in a man up to the present date is said to be less than sixty, and accurate description of the characteristics of such infections has been achieved only in the last twenty years. K. W. Taber has reported another case and reviews briefly what is known on the subject.[1] He points out that torular infection has been reported of the skin, central nervous system, lymph glands, tongue, knee, naso-pharynx, meninges, lungs and, indeed, the entire body. When the lungs are infected the picture resembles that of tuberculosis or carcinoma, and curiously enough

[1] *The Journal of the American Medical Association*, April 24, 1937.

when the central nervous system is affected the differential diagnosis also has to be made from tuberculous meningitis or cerebral tumour. Perhaps something unusual may be remarked in the individual case, such as the relative absence of fever or sweats, and the paucity of physical signs in the chest in the case of lung infections or correspondingly aberrant signs in cases of infection of the nervous system. But these are not likely to be distinctive, and the diagnosis is always made by the bacteriologist. Torular infection of the nervous system is always fatal so far as present experience goes, but more favourable results may be observed in lung infections or in those of the tongue or skin. Treatment is, as might be expected, very unsatisfactory. Taber holds that serum from an immunized horse should be used, and he mentions preparations of arsenic and antimony as having been used, also iodides which have been used in large doses in a number of cases. There seems nothing to commend any particular line of treatment in the present state of our knowledge, but there may be something in Taber's contention that a local infection with a histolytic torula should be considered an indication for surgical removal of a circumscribed area.

The case reported in the present instance is one of an elderly patient who died after a rapid exacerbation of a chronic inflammatory lesion of the lungs. Cultures had revealed the presence of a torula in the sputum before death, and at *post mortem* the lung tissue showed considerable cellular infiltration and œdema, with some fibrosis, and there was in addition a considerable filling of the lung with a tenacious muco-purulent material. This patient gave a history of having many years before ridden a horse a good deal which had to be disposed of on account of some illness affecting its respiratory system.

This rather quaint history may be quite irrelevant, but it is curious that infection of the lung in a horse by a torula has actually been described in the literature. Admitting that we are dealing here with a rare disease, it may be as well to point the moral, which is that bacteriological examination of sputum and of cerebro-spinal fluid in cases likely to be those of severe and important infection is most necessary, particularly when we remember that the diagnosis of pulmonary tuberculosis is now frequently made on little other evidence than that of an X ray film.

THE USE OF MAGNESIUM TRISILICATE IN PEPTIC ULCER.

MAGNESIUM TRISILICATE has been recently recommended as an anti-acid preparation specially suitable for the neutralization of excess hydrochloric acid in cases of peptic ulcer. This substance is claimed to be of particular value, since it not only acts on an efficient base, but also has adsorbent properties. W. N. Mann has carried out some exact experiments on its action both *in vitro* and *in vivo*, and has made an estimate of the relative importance of the physical and chemical actions of this drug.[1] A patient was selected for study whose history was characteristic of recurrent peptic ulcer, and in whom the diagnosis was confirmed by the finding of occult blood in the fæces and the radiological demonstration of a crater in the wall of the stomach on the lesser curvature. After three weeks of rigorous treatment on a milk diet, with atropine and olive oil, a continuous fractional test meal observation was made, that is, specimens for analysis were aspirated through a small stomach tube at half-hourly intervals. These tests were carried out for over nine hours, and during this period hourly feedings of milk were given, each followed half an hour later by one drachm of magnesium silicate. No free acid could be detected in any specimen during the test period. Some days later a parallel experiment was carried out in which the silicate was omitted. In this free acid was present in the majority of the specimens, often in considerable quantity, and the total acidity was considerably higher than had been the case in the previous series. This seems to confirm the efficacy of this preparation as a neutralizer of acid under the conditions prevailing during digestion. Mann points out that various workers have found that bismuth carbonate is not so effective as magnesium carbonate, and that the latter, although quite competent to neutralize acid, tends to leave the pH of the stomach contents too high, that is, on the "alkaline" side of neutrality. On repeating these experiments *in vitro* with magnesium silicate, he found that free acid could not exist in the presence of an excess of this salt, and then set out to discover how far the neutralization was due to chemical reaction and how far to adsorption. Neutralization proceeded rapidly at first, and equilibrium was attained when 92% of the equivalent amount of acid had been neutralized by the silicate; 70% of this action was found to be due to chemical action and the remainder to adsorption. It would appear that magnesium silicate is a suitable substance for correcting gastric hyperacidity, and Mann thinks that one drachm of it will neutralize two pints of N/20 hydrochloric acid, an amount which represents the average acidity of the stomach contents. It may be remembered that tribasic magnesium phosphate was highly praised a few years ago as being a very effective corrective of hyperacidity, but it does not seem to be firmly established. Perhaps the additional adsorbent properties of magnesium silicate may win a greater degree of popularity for this salt, but probably the last word is not yet said. The sceptic may even doubt whether complete neutralization of the free acid in the stomach is a *sine qua non* in the treatment of peptic ulcer; but it must at least be admitted that it is desirable to possess accurate information concerning the various preparations used for this purpose.

[1] *Guy's Hospital Reports*, April, 1937.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Treatment of Epithelioma of the Lip by Electrodesiccation.

H. MORROW, H. E. MILLER AND L. R. TAUSSIG (*Archives of Dermatology and Syphilology*, May, 1937) give a preliminary report of the results obtained during the last five years in the treatment of epithelioma of the lip by electrodesiccation; they also describe the technique of their method. During the past five years they have treated 139 patients who were suffering from early epithelioma of the lip, by curettage and electrodesiccation. They have used local anæsthesia and have treated patients "in the office" and in the out-patient department. They conclude that the clinical and cosmetic results are as good as those which follow surgical therapy. They draw attention not only to the effectiveness of the treatment, but to the ease with which it can be applied and to the small expense to the patient. They anæsthetize the area by injecting around it one or two cubic centimetres of a 2% solution of procaine hydrochloride. The lip is compressed between the thumb and forefinger by an assistant and the pulpy tissue is removed by means of a sharp curette. This, the authors hold, permits a far more accurate survey of the extent of the lesion than can be obtained by inspection and palpation. The growth frequently shells out, showing a line of demarcation between it and normal tissue. After curettage the area is treated with "a rather intense monopolar current", the tissue being desiccated to a depth of two to three millimetres. The area heals in about six weeks.

The reading of this paper was followed by a discussion in which widely divergent opinions were expressed. E. F. Traub pointed out that it required great experience for an operator to curette a carcinoma of the lip and to be certain that he had gone beyond any possible extension. He thought that it was much safer to remove the local lesion by means of the electric cutting current and so to mark the removed specimen that the pathologist could tell immediately whether any border was not sufficiently widely removed.

The Glomus and the Glomus Tumour.

W. FREUDENTHAL (*The British Journal of Dermatology and Syphilis*, April, 1937) discusses the glomus and the glomus tumour (Masson), and R. G. ANDERSON and F. PARKES WEBER give a clinical account of a case. The description by Sucquet in 1862 of *canaux dérivatifs* was amplified in 1877 by Hoyer; and other investigators, including Grosser, von Schumacher, Popoff *et cetera*, thoroughly investigated arterio-venous aneurysms. In 1924 Masson pointed out that the anastomoses are provided with a special nervous apparatus and surrounded by loose lamellar connective tissue. For these organs he suggested the name neuro-myo-arterial glomus, and then he proved that certain organoid overgrowths originated from them which are known as glomus tumours. In human beings the normal glomus has as yet been found only in the hands and feet. The glomus is most numerous in the nail-beds and in the tips of the fingers. In a glomus which has a diameter of 60μ to 200μ it is possible to distinguish an afferent artery, the arterio-venous anastomosis proper, the collecting vein or veins, and coarse lamellated connective tissue fibres surrounding these structures. Freudenthal discusses the physiology of the glomus and enumerates certain experimental observations that have been made about them. Anderson and Parkes Weber describe a glomus tumour that appeared on the left little finger of a woman, fifty years of age. For more than twenty-five years she had complained of pain in the finger. The tumour on the finger is described as consisting of a slight oval elevation measuring four by five millimetres. Its surface was purple and slightly shiny; the elevated spot was extremely tender. The tumour was excised under local anæsthesia; the wound healed and tenderness disappeared. The article is illustrated by photomicrographs.

The Relation of Diet to Cutaneous Infection.

D. M. PILLSBURY AND T. H. STEENBERG (*Archives of Dermatology and Syphilology*, May, 1937), in reporting the results of their studies of the relationship of diet to cutaneous infection, point out that, though dietary revision is often advised in the presence of pyogenic infection of the skin, there is little experimental evidence that offers a rational basis for such procedures. They have tried to determine whether diet, particularly the carbohydrate fraction, influences the course of an experimental infection of the skin in normal non-diabetic animals. They have therefore observed the reaction produced in the skin after intradermal injection of a suspension of living staphylococci and streptococci in fasting dogs and in dogs receiving (*a*) "normal", low carbohydrate diets, (*b*) high carbohydrate diets, (*c*) high fat diets. The authors sum up their findings by stating that the cutaneous infections in general were more severe in animals on a high carbohydrate intake than in those on a low carbohydrate or a high fat diet and in fasting dogs. Estimations of the sugar content of the blood showed that no significant variations from normal occurred. In six of eight animals that were given a high fat diet evidence of acidosis developed, but the infections noted in these animals were with one exception mild. The glycogen content of the skin showed but slight response to variations in the diet, and there was no evidence indicating that it was of any great importance in the metabolism of the skin or in the organism as a whole. The authors' general conclusion is that the course of an experimental infection of the skin is more severe in animals that are on a high carbohydrate intake than in animals on a low carbohydrate or a high fat intake, or in fasting animals.

Treatment of Scabies by the Danish Method.

A. M. GREENWOOD AND M. REILLY (*Archives of Dermatology and Syphilology*, April, 1937) state that the use of the so-called Danish method of treating scabies was introduced into the Massachusetts General Hospital in 1923 and has been used there ever since. The method consists in the application of an ointment described by Svend Lomholt in 1920. The authors do not describe the ointment, but refer readers to *The Lancet* of December 18, 1920, at page 1251, where the method of preparing it is given in detail. Particulars are given of 4,522 persons who were treated—2,582 patients and 1,940 contacts. It is claimed that in 93·85% of cases cure resulted from a single application of the ointment. In 5·6% a dermatitis followed the application. The authors reproduce the printed directions that are given to patients. They point out that it is necessary to pay the strictest attention to the giving of instructions to patients, to technique, to treatment of contacts and to the "following-up" of patients.

UROLOGY.

Pathogenesis of Enuresis.

E. M. SIENKIEWICZ AND G. W. SEGALIN (*Zeitschrift für Urologie*, May, 1936) discuss the views of other authors on the pathogenesis of enuresis in general, and review a series of 80 personal cases in enuretic patients over eighteen years of age. These authors are convinced that there is a very close connexion between enuresis and congenital syphilis. Other authors have found a positive Wassermann reaction in 17% to 40% of their young patients. In the authors' series of 80 older patients, however, only two showed a positive blood serum Wassermann reaction; they remind us, however, that the absence of reaction in patients of maturer years does not exclude the presence of congenital syphilis. Careful inquiry into the medical history of parents and relations of these patients reveals the presence of *tabes dorsalis* or paresis.

Therefore, apart from local examination of the state of the internal sphincter muscle, posterior part of the urethra, prostate *et cetera*, a complete neurological examination should be carried out; and, finally, careful inquiry should be made into the medical history of previously living and present relatives. When there is the slightest justification for such a course, anti-syphilitic treatment should be instituted.

The Practice of Pyelography.

R. BOUCHARD-POTOCKI (*Journal d'Urologie*, August, 1936) lays down the principles which should always be followed in performing retrograde pyelography. It is widely recognized that serious difficulties beset the interpretation of excretion urograms, and that ascending urography by injection through the ureteric catheter is indispensable for correct and intimate diagnosis in many cases of upper urinary tract lesions. The author considers that retrograde pyelography should always be bilateral, even though the symptoms are distinctly unilateral. He further considers that an exposure made with the patient in the vertical position should never be omitted, and finally that complete uretero-pyelography should always be undertaken.

Chemical Sympathectomy of the Renal Pedicle.

M. PAVONE (*Urologia*, September, 1936) refers to the method originated by Dambrin and further developed by the author, of total denervation of the renal pedicle designed for the cure of painful or hæmorrhagic nephritis. The main nerve trunks and filaments are first of all removed mechanically and then the vessels are gently brushed with a carbolized solution called Doppler's solution, concentration of which is not stated, in order to destroy the finest filaments. Decapsulation is necessary in addition in order to interrupt the continuity of sympathetic filaments entering the cortex via the perirenal fat. The author has employed the method with satisfactory results in many cases during the past ten years, and the remote results in the earlier cases prove that the beneficial effect on the nephritis is not simply transient.

Dietary Management of Urinary Calculus.

C. C. HIGGINS (*British Journal of Urology*, March, 1937) has produced experimentally the following calculi: calculi of calcium carbonate and of calcium ammonium phosphate in white rats, calculi of calcium ammonium phosphate in dogs, calculi of uric acid in chickens, and calculi of uric acid in Dalmatian dogs. He has since prescribed a dietary regimen for calculous patients, and concludes that it is efficacious in certain groups. He claims that the incidence of recurrent urinary calculi has fallen from 16·4% to 4·7% and that when prolonged immobilization has been necessary no calculi have formed. He further claims that dissolution occurred in thirty-two cases in which pelvic calculi were so large or so situated that they could not be passed spontaneously. No success was obtained in patients in whom bilateral renal calculi and large calculi requiring nephrectomy were present. If dietary treatment is to be undertaken, certain methods are indispensable. The treatment must be commenced in hospital. The pH of the urine from the affected kidney must be determined before treatment and checked at intervals. Any infecting organisms should not only be identified, but also tested to determine whether they are urea-splitters. Each patient must be treated as an individual, and the constituents of the basic diet must be varied until the desired pH of the urine is obtained. Biophotometer tests for vitamin *A* deficiency are made. The dietary management is used in addition to, not in lieu of, the non-operative measures previously employed.

Extrarenal Hypernephroma.

C. GÜTIG AND A. HERZOG (*Zeitschrift für Urologie*, January, 1937) study previously reported cases of extrarenal hypernephroma, particularly with reference to diagnostic possibilities; they also report a case of their own. In the presence of swellings in the upper part of the abdomen it is important to determine whether the tumour is intraperitoneal or extraperitoneal, especially with reference to the operative approach and the question of preservation of the kidney. With tumours in the renal area a normal pyelogram and good renal efficiency may be misleading, in that they may make the surgeon decide in favour of an intraperitoneal growth. A most important sign, often present, is displacement of the kidney, which does not occur with intraperitoneal tumours, but which often occurs with extrarenal hypernephroma, retroperitoneal abscess and primary or secondary retroperitoneal neoplasms.

Alkaline Encrusted Cystitis.

A. RANDALL AND E. W. CAMPBELL (*Journal of Urology*, February, 1937) report five cases of alkaline encrusted cystitis in female patients without lesions causing urinary obstruction. They believe that any infecting organism is of less importance than the acidification of the urine in the whole urinary tract. In this connexion attention is directed to the variability of the hydrogen ion concentration of the urine from the separate renal pelves, and the necessity for acidification of the upper urinary tract (whether it is infected or not) is stressed. Acidification of the urine cannot be achieved by oral administration of drugs nor by diet in the presence of alkaline encrusted cystitis. Supplementary pelvic irrigations with acid solutions are necessary in the preliminary stages. An acid reaction may then be maintained by drugs. The most successful acid medium for lavage is phosphoric acid. The renal pelvis tolerates a 2% solution well, but in the bladder the highest concentration used is 1%.

Morphology of the Ureter after Labour.

IN order to get some idea of the morphology of the ureters after labour, X. J. CONTIADES (*Journal d'Urologie*, November, 1936) has made a study of the ureters of women in the *post partum* period when no urinary tract lesion was present. In no single case did a ureter, as outlined by retrograde pyelography, correspond to what is generally considered as normal. The *post partum* "stigmata" outlined by the author are as follows: (*a*) dilatation of the lumbar portion of the ureter to form a narrow spindle, wider towards the lower end of the spindle; (*b*) slight relative narrowing at the level of the pelvic brim, with more or less angulation at this point; (*c*) the pelvic portion is frequently sinuous and slightly dilated.

Renal Carcinoma.

B. VON MEZO (*Zeitschrift für Urologie*, August, 1936) has made a macroscopic and microscopic study of eight cases of renal carcinoma, as well as of several cases of the usual typical hypernephroma. As a result of this study, which revealed mixed and transitional forms of neoplasm, the author considers that it is scientifically doubtful whether a true line of division can be drawn between renal carcinoma and hypernephroma. Moreover, in the present state of knowledge of the pathology of these conditions, the practical value of such a demarcation is very slight, and such value as there is lies only in the question of prognosis, which is considered to be somewhat more unfavourable in carcinoma and atypical hypernephroma than in typical hypernephroma.

Vesico-Ureteric Reflux.

A. OBERNIEDERMAYR (*Zeitschrift für Urologie*, June, 1936) from many experiments in rabbits concludes that the occurrence of vesico-ureteric reflux depends (*a*) on the possibility of increase in endovesical pressure, and (*b*) on the possibility of occurrence of that physiological reflux which consists of suspension of the normal activity of the ureter in the presence of increased endovesical pressure. These conditions are fulfilled in deep general anæsthesia, and on producing such deep narcosis in rabbits the author was invariably able to secure reflux up the ureters by filling the bladder.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held at the Medical Society Hall, East Malvern, on Wednesday, May 5, 1937, PROFESSOR R. MARSHALL ALLAN, the President, in the chair.

Bronchiectasis.

DR. C. J. OFFICER BROWN read a paper entitled "Bronchiectasis: The Course and Treatment" (see page 39).

DR. W. S. NEWTON said that one year previously, at a meeting of the Royal Australasian College of Surgeons held in Sydney, he had opened a similar discussion to the present one. As his views on bronchiectasis had not materially altered, the opinions then expressed would be reiterated that night.

A study of the present position with regard to the treatment of bronchiectasis left one in no doubt that the only hope of cure lay in the surgical removal of the diseased lobe or lung. Dr. C. J. O. Brown had very ably described the operations employed in such extirpation of the affected portion of the lung, namely, lobectomy and pneumonectomy. Sufficient evidence now existed to justify the statement that surgical procedures not directed towards extirpation of the diseased area were of little help and in fact might be detrimental. Phrenic avulsion was not only of little avail, but was often actively harmful by abolishing diaphragmatic movement and so impeding drainage of the affected area by coughing. In Dr. Newton's opinion the results of thoracoplasty were not good enough to justify the risk involved in the operation. Compression therapy was rarely of value. Dr. Newton's personal experience of artificial pneumothorax was limited to eighteen cases, in which two of the patients were apparently cured. These were treated before the introduction of lipiodol as a diagnostic measure, and Dr. Newton now believed that the diagnosis was inaccurate and that no true bronchial dilatation was present. This treatment gave little prospect of cure except in very early cases, which, however, could be more efficiently treated by bronchoscopic drainage.

There was no doubt that in the future resection of the affected portion of the lung would be generally practised in suitable cases, but there was also no doubt that this operation should be performed only by those who had devoted special attention to this branch of surgery. Graham's figures were instructive in this respect, in that he had performed 54 operations of this type with six operative deaths. The Brompton Hospital surgeons had operated upon 107 patients with 15 operative deaths. It therefore seemed that improvement in the results of the treatment of bronchiectasis could best be achieved by earlier diagnosis of the condition and skilled surgical treatment. These figures had been published in 1935, and recent reports by competent surgeons indicated a definite fall in the mortality rate.

There was doubt as to the type of case suitable for lobectomy and pneumonectomy. Until recently this method had been considered feasible only in those cases in which the disease was confined to one lobe or even to one lung. Dr. Newton's experience of lobectomy comprised only some seven cases. He was impressed with the fact that in two of these cases there were slight dilatations present in the other lung at the time of operation. Both patients made a good recovery after lobectomy, but unfortunately there had been considerable advance in the bronchial dilatations in the other lung, the patients' present condition being no better than that prior to operation. Recent surgical literature showed a tendency to operate in bilateral cases, the most affected lobe being removed. Churchill, as recently as January, 1937, had reported five cases of bilateral lobectomy with one death. It was as yet too early to judge the result of such procedures, but Dr. Newton was not convinced that surgery was as helpful to these patients as postural drainage and bronchoscopy. It was stated that the duration of life of those affected with this disease was comparatively short unless the diseased area of the lung was removed. Dr. Newton rarely saw patients under the age of twelve years, nor did he know whether the climatic conditions in this country had altered the mortality rate; but he did know that he had in his own practice many patients with bilateral bronchiectasis who by postural and bronchoscopic drainage had been maintained in reasonably good health and capable of earning their livelihood for periods of over ten years.

He found, on consulting the records, that of the last 100 patients admitted to the Alfred Hospital, Melbourne, on account of bronchiectasis prior to March, 1936, in only 27 was the condition unilateral and therefore possibly suitable for extirpation. Thus there were at present a very large percentage of cases in which, owing to the extent or distribution of the disease, it was impossible to obtain a cure by this or any other means. Dr. Newton wished, however, to direct the attention of those present to the fact that it was possible, by means of suitable team work of physician, bronchoscopist and radiologist, to improve the condition of most of these patients and to enable many to function as useful members of the community. Team work of this description had been inaugurated at the Alfred Hospital in 1920, when Dr. Newton collected a number of cases in an out-patient clinic. At this time postural drainage and, in selected cases, artificial pneumothorax had been the chief methods of treatment. The injection of lipiodol, introduced by Siccard and Forestier in 1921, had first been employed at the hospital by Dr. J. F. Mackeddie in 1923. Dr. Athol Blaubaum had joined the team in 1930. He immediately became interested in the work and was an acknowledged master of his favourite instrument, the bronchoscope. Dr. Newton believed that Dr. Blaubaum had the largest bronschoscopic clinic in this country. In the last few years Dr. C. J. O. Brown had interested himself in the surgery of this condition, but, owing either to a dearth of suitable material or to the success of Dr. Blaubaum, he had not as yet been given much opportunity to practise this branch of surgery.

Dr. Newton went on to say that the remainder of his remarks would be devoted to a summary of the opinions formed as a result of his experience as a member of this team.

Prophylactic treatment was of great importance. Suitable measures had to be undertaken to cure infected nasal sinuses. When a foreign body was present in a bronchus, even prompt removal followed by aspiration of the pus would not always prevent the development of bronchiectasis. Though collapse of the affected lobe would quickly disappear after removal of the foreign body, it often recurred owing to subsequent swelling of the infected mucosa leading to bronchial stenosis. If this stenosis was not promptly relieved by bronchoscopic dilatation and drainage, bronchiectasis or the formation of multiple abscesses would supervene. Dr. Newton had eight cases in which bronchiectasis had resulted from neglect of this precaution.

The diagnosis of bronchiectasis could be definitely established only by lipiodol injection. He had now almost discarded the use of the passive methods of introduction in favour of the bronchoscopic method, for the reason that bronchial stenosis in some form or other was generally present. This injection should be given in all cases of chronic pulmonary sepsis other than those which were due to tuberculosis, in all cases of suspected bronchial stenosis, in all cases of repeated hæmoptysis in which no clinical or radiological signs of tuberculosis were present, and in all cases in which a persistent cough followed influenza or nasal sinusitis. Archibald and Brown had clearly indicated the dangers of lipiodol injection in pulmonary tuberculosis.

Whatever the type of case or the line of treatment determined upon, postural drainage played an important part. In many cases it was the main treatment after any obstruction had been removed by bronchoscopy. In others it was used in association with repeated bronchoscopic

aspiration, and it was also of great value as a preliminary to operation. Unfortunately the mechanics of this proceeding did not seem to have been grasped by most practitioners.

For success it was essential to place the patient in such a position that he lay in the long axis of the cavity. If the cavities were multiple, then two or three positions might be necessary. To ascertain the optimum position, the post-lipiodol X ray appearances and the data obtained by bronchoscopic examination should be carefully considered in relation to the clinical findings, and even then a certain amount of trial and error would probably be necessary.

Postural drainage might be carried out continuously or intermittently. The continuous method was used for patients who were very ill, and the position was obtained by tilting the bed. For intermittent postural drainage some sort of table was advisable. Many tables were advocated, but Dr. Newton used one made from flooring boards, which, though inelegant, was cheap and effective. The effectiveness of this procedure was considerably increased when it was used in conjunction with bronchoscopic aspiration. Much discussion had arisen about the use of expectorants in association with postural drainage. He used them and was certain that they were of value.

He found little of value in other medical procedures. Injection of arsenical preparations, in this country at least, seemed only of use when the fetor was due to one of the spirochætal organisms. Vaccines seemed of little avail, even when made from the pus gathered in the cavity itself.

The value of bronchoscopy in diagnosis was now generally admitted, but many seemed unwilling to agree that it was more useful than any other form of conservative treatment. This was especially evident in the writings of the English school, and was remarked on by Davidson, who stated that "the use of the bronchoscope not only in diagnosis, but also in treatment of suppurative lung lesions is still unfortunately neglected in this country at least".

In expert hands it was really a simple procedure, which, with rare exceptions, might be performed under local anæsthesia in patients over ten or twelve years of age. It had to be understood that bronchoscopic drainage was used nearly always in association with postural drainage. Its objective was not to abolish the cavities, but to keep them dry and thereby to maintain the patient in a symptomless condition. It was certainly the only effective available method of dealing with the bilateral type of case. It was also of considerable value in many unilateral cases, especially those of bronchiectasis following lodgement of a foreign body in the lung, and of abscess caused by nose and throat operations. In these cases it should be instituted at the earliest possible moment, for if not only helped to prevent local spread, but also prevented "spilling over" and consequent infection of the other side. In some cases one or two treatments were sufficient to promote good drainage, and the patient was then able to carry on with posture alone. In others this was possible only after a series of treatments, and in a few repeated bronchoscopy was necessary. The symptoms indicating that further bronchoscopic aspiration was required were: (*a*) increase of cough and expectoration, (*b*) a sudden decrease of expectoration, or (*c*) the return of toxic and general symptoms.

The bronchoscope, except perhaps in the early and mild case, could not produce a cure, but with the aid of postural treatment bronchoscopic aspiration would frequently maintain the patient in a symptomless condition and permit him to take his proper place in society. Whilst Dr. Newton could maintain a patient in reasonable health by this means, he hesitated to submit him to an operation in which the mortality was at present, even in the most skilful hands, at least 14%.

In summary, Dr. Newton said that prophylactic treatment was of the greatest importance, especially in the lung abscess and foreign body type. Surgery was the only treatment that held out hope of cure. The only useful operation consisted in extirpation of the diseased area. The percentage of cases suitable for such operation was comparatively small, but this could be increased by early investigation of the suspected case and by care in the prevention of "spill-over". Bronchoscopy and postural drainage, though not providing a cure, would alleviate the condition and maintain many patients in a symptomless condition. They were the best of the conservative methods of treatment, and in the bilateral case they were, in Dr. Newton's opinion, the only effective form of treatment.

DR. JOHN O'SULLIVAN outlined briefly the pathogenesis of bronchiectasis. He referred to the varying radiological findings as seen on plain X ray films. At times there was a honeycombing from small air-containing, thin-walled cavities. Often there were large cyst-like spaces, with at times fluid level formation to be seen. Again, streaking, especially at the bases, from the dilated bronchial tubes filled with secretion was to be observed. At other times there was only an area of increased density, indicating the associated changes in the neighbourhood of the bronchial dilatation.

Dr. O'Sullivan stressed the fact that in the less developed or early stages of the bronchial dilatation there were no definite findings to be made out in the plain X ray film. He demonstrated his technique of lipiodol bronchography with the special introducer, designed for the introduction of the intratracheal catheter. The importance of the screening control of the lipiodol injection was emphasized. By means of this technique it was possible to direct the lipiodol into any desired portion of the bronchial tree. Lantern slides exemplifying the cylindrical, saccular and combined types of bronchiectasis were shown. Slides illustrating a polycystic disease involving both lobes of the left lung, with a complete stenosis of the left bronchus, were shown. A series of slides of an abscess in the middle lobe of the right lung, going on to fibrosis and the associated development of a localized cylindrical bronchiectasis was demonstrated. Another series indicating the development of bronchiectasis in the right lower lobe following on the aspiration into the bronchus of a tooth during a dental extraction was also shown.

DR. ATHOL BLAUBAUM said that patients with suspected bronchiectasis were first sent to the radiologist. The latter could determine from the bronchogram whether the disease was present and whether it was localized or generalized. At the same time an X ray examination of the paranasal sinuses was made. The patient was then referred for endoscopy and prepared for the mapping out of the bronchial tree with lipiodol. The bronchoscope made it possible to determine under direct vision whether any bronchial obstruction was present. This obstruction might be due to foreign body, neoplasm, stricture *et cetera*, and these conditions would have to be dealt with first. Apart from the above conditions there was seen in all cases of suppurative disease of the lungs, including bronchiectasis, an inflammatory œdema, causing obstruction in the bronchi, leading to the bronchiectatic cavities. This interfered with the normal drainage and ventilation of the lungs. Even if the patient was made to cough and was placed in such a posture that he got rid of a large amount of secretion, they always found, on looking down the bronchoscope, a residual quantity of thick foul pus bubbling through the swollen inflamed mucosa of the tube leading to the cavity. These tubes could be dilated and the pus could be evacuated by the suction tube until the lung was as dry as it was possible to get it, and the patient was now ready for the lipiodol, which was instilled through the endotracheal catheter.

The patient was examined with the screen whilst the lipiodol was injected, and it was possible to see the oily solution runing down, filling up the bronchial tree, and any cavities or dilatations which might be present. He was then placed in the different positions required for the mapping out of both sides. Postero-anterior and lateral bronchograms were then taken. Twenty cubic centimetres of lipiodol were sufficient to do this, but up to forty cubic centimetres had been used.

The examination was conducted under local anæsthesia, a 3% solution of "Pantocaine" being used. This facilitated the procedure, and also inhibited coughing and so stopped any spill-over of the lipiodol into the alveoli. By this

method it was possible to map out the lesion with far greater accuracy than in any other way.

Dr. Blaubaum went on to say that in order that the patient might derive the maximum benefit the endoscopic treatment was carried out in conjunction with the physician, who controlled the medical and postural treatment which was so necessary. The physician would also determine by the patient's progress how often and at what intervals bronchoscopic aspiration was to be instituted. These endoscopic aspirations were also useful in the preparatory treatment of a patient for the surgeon who was to perform a lobectomy.

Dr. Blaubaum said that he relied mainly on thorough aspiration under vision. A good suction apparatus was essential. It was necessary to open up by suitable bougies the endobronchial obstructions caused by œdema and granulations so that better drainage was ensured. This better drainage and ventilation were the secret of success. No lavage and no antiseptics were used. Where there was a copious secretion a biweekly treatment was instituted, but most patients were considerably relieved by weekly treatments.

It was often found that patients whose bronchiectasis had not advanced very far obtained a symptomatic cure, but if cavitation was present the condition would sooner or later light up again. The great indication in cases of bronchiectasis was early diagnosis. The disease usually started in childhood. If cavitation was present, the aid of the surgeon should be sought, especially if the disease was unilobar. It should be thoroughly understood that once bronchiectasis was well established, the only hope of cure was the complete removal of the disease by the surgeon. This, of course, was not always feasible. Endoscopic methods could be relied on to lessen the secretion considerably, to reduce the toxæmia, to get rid of the foul odour and to lessen the cough so that the patient could sleep. The patient, unless he could be cured by the surgeon, would be "a medical case" as long as he lived, and would be liable to complications, such as cerebral abscess *et cetera*, all the time.

The question of the relation of sinusitis to bronchiectasis was not yet settled. The majority of workers considered that the sinusitis was part of the general infection and occurred with the bronchiectasis. Other authorities claimed that it was a precursor of the lung condition; whilst others maintained that sinusitis was secondary and due to the continual spraying of the nasopharynx which was always occurring with coughing. The fact remained that patients with bronchiectasis were seen who had no sinusitis.

Dr. Blaubaum had seen a great number of sinusitis patients with clear lungs, and he did not recall one whose condition went on to bronchiectasis. In patients with sinusitis whose bronchiectasis was not far advanced, and also those who would come to lobectomy, these upper respiratory infections had to be got rid of; but he was of opinion that in advanced multilobar bronchiectasis no benefit was derived from operations on the sinuses, and they were therefore not warranted.

DR. J. F. MACKEDDIE said that this subject came up frequently for discussion because of the interest attached to lipiodol visualization of the exact nature and extent of this serious pulmonary condition; the condition was only less serious than malignant disease in the lung. He had the impression that there were very few patients in the out-patient department of adult age who had had the disease in early life; most of them were dead. It was Chevalier Jackson who had perfected "lung toilet" through the bronchoscope after serious lung procedures; he had been seized with the serious nature of such conditions and the fatality associated with them. Dr. Mackeddie commented on the clinical appearance of children who came to the doctor with cough and a lot of sputum, and who often appeared quite robust and chubby, but the lipiodol investigation disclosed extensive bronchiectasis; their relatives seemed to be surprised at the necessity for hospital treatment. It was hard to realize that conservative measures could do any good, and the only thing that had stopped the advance of operative treatment had been the very great success of the careful wiping out of the bronchi through the bronchoscope. It was also necessary to think of the psychological benefit to be derived from having something done. At one time he had begun to think that posture treatment and bronchoscopic evacuation were all that was required, but surgery was definitely the coming method of choice, and as the surgeons perfected their technique the risk would be minimal. This deadly thing in the lung had got to be cut out when such a procedure was feasible, but it could not be contemplated in quite a large proportion of cases.

Dr. Mackeddie went on to say that the type of case suitable for surgery was very limited and that, judging by their experience with the cases handed over for thoracoplasty, the surgeons had not had a fair deal in lung surgery. He pointed out that they were under a debt of gratitude to Dr. Brown for the interest he had taken in this special work; it must be assumed that the operator who undertook this work was to be a specialist at it; in the hands of an ordinary surgeon it might be homicidal. This class of surgery did not have the glamour of brain surgery, but he hoped that Dr. Brown would get the opportunity of gaining further experience at it and on some future occasion would report the result to the Association.

PROFESSOR R. MARSHALL ALLAN, from the chair, expressed the thanks of those present to Dr. Brown and those who had contributed to the discussion. The work showed evidence of very fine team work. The surgery of closed cavities was being conquered; though it was only a distance of under two inches from the skin to the heart or lung, it had taken two thousand years for these organs to be reached by the surgeon's knife, and until recent years it had been considered that one could do nothing surgically when a pathological process took place in certain sites which had formerly been regarded as inaccessible.

Dr. Brown expressed his thanks for the manner in which his paper had been received.

DR. W. J. NEWING mentioned that the condition of apical bronchiectasis had not been emphasized; these lesions were very like tuberculous lesions, and physical signs were elicited similar to those found in advanced cavito-caseous pulmonary tuberculosis. In middle life such a condition was a menace in diagnosis; radiographically, stringy or cord-like increases in density were seen rather than the shadows associated with tuberculous disease. Dr. Newing also questioned the applicability in this country of certain Continental statistics concerning the length of life of patients with bronchiectasis; he felt sure that some of these patients lived to advanced years and that the average duration was distinctly greater than was indicated in these statistics.

A MEETING of the Victorian Branch of the British Medical Association was held at the Royal Melbourne Hospital, Melbourne, on Wednesday, May 19, 1937. The meeting took the form of a number of clinical demonstrations by members of the honorary staff.

Exophthalmic Goitre.

DR. VICTOR HURLEY demonstrated two unusual cases of exophthalmos. The first patient was a woman, thirty-four years of age, in whom exophthalmos, though present in both eyes, was much more definite in the right eye. The history, clinical signs and symptoms were those of a typical moderately toxic goitre. Subtotal thyreoidectomy was performed on April 5, 1937, under gas and oxygen anæsthesia after the usual pre-operative preparation. The patient's condition had rapidly improved, so that by April 14, 1937, the pulse rate while she was sleeping was 84, and she left the hospital on April 21, 1937. Dr. Hurley said that the exophthalmos had steadily lessened, but it was still more noticeable in the right eye, though the difference between the two eyes was not so distinct as before the operation.

Another patient shown by Dr. Hurley, a woman, fifty-two years of age, had been operated on on September 14,

1936, as a typical case of toxic goitre. The exophthalmos had seemed more pronounced in the right eye than in the left. Dr. Hurley said that since the operation her general condition had steadily improved and the toxic symptoms had subsided, but the exophthalmos had become progressively more prominent, so that she had diplopia in certain positions and the eyelids barely failed to meet over the globe of the eyes, especially on the right eye.

Fractured Neck of Femur.

Dr. Hurley also showed a female patient, forty years of age, who had been admitted to the hospital on September 19, 1936, with intracapsular subcapital fracture of the neck of the left femur. Skiagrams had shown the neck and shaft to be adducted; it had been necessary to draw them up and rotate them externally. A Thomas knee splint with strapping extension in abduction was applied to each lower limb. Dr. Hurley said that on September 29, 1936, skiagrams had shown the position of the fracture to be satisfactorily corrected, with slight anterior bowing of the neck and slight external rotation. On October 4, 1936, a Whitman's plaster was applied under an anæsthetic, with the fractured leg well abducted and internally rotated. Progressive skiagrams had shown union taking place slowly but satisfactorily. The plaster of Paris was changed twice and the Whitman's plaster finally removed on February 23, 1937, when satisfactory union was found to be present. On March 8, 1937, the patient was discharged from hospital in a light plaster spica and on crutches, and at the time of the meeting was able to walk well with the aid of a stick. Dr. Hurley remarked that he showed the patient to invite expressions of opinion on the relative advantages of treating fractures of the neck of the femur by operation or by Whitman's method.

Prostatomegaly.

Dr. Hurley also showed a male patient, eighty-one years of age, who had been admitted to the hospital on March 6, 1937, with retention of urine and with a history of attacks of retention of urine on and off for twenty years, relieved by catheterization. His condition on admission was good, and on passing of a catheter twenty ounces of urine were drawn off. He regained control of micturition and voided small amounts of urine frequently. The patient's renal function tests gave good results and rectal examination revealed an unusually large, firm, smooth prostate with no suggestion of malignant disease. On March 25, 1937, a suprapubic cystostomy was performed and a de Pezzer catheter was inserted. Bladder wash-outs were given daily and free fluids and urinary antiseptics were administered by the mouth. Some wound infection had occurred and on April 15 suprapubic prostatectomy was performed under gas and oxygen anæsthesia. The prostatic cavity was lightly packed with gauze soaked in 1 in 1,000 "Flavine" around a gum elastic catheter *per urethram*; suprapubic drainage was also provided. Five days later the catheter and suprapubic tube were removed, and on May 1, 1937, urine was passed by the urethra and the patient had been up and about the ward for several days prior to the meeting. Dr. Hurley invited discussion as to the safest method of steering elderly patients safely through prostatectomy. It was submitted that a two-stage operation with simple enucleation of the prostate at the second stage, without lengthy intravesical manipulations, was the operation best suited for many elderly patients, who were "bad risks".

Vesical Calculus.

Another patient shown by Dr. Hurley was a male, sixty-two years of age. Six years earlier a suprapubic prostatectomy had been performed, with relief of his urinary symptoms, and he had remained well until a month previous to the meeting. Four months prior to the meeting he had noticed a stabbing pain in the rectum when he passed urine, and there had been frequency of micturition for a month. Examination revealed considerable pyuria, and on rectal examination a hard mass was felt in the region previously occupied by the prostate. Skiagrams showed the presence of a large dumb-bell shaped calculus, the smaller portion in the bladder and the larger portion in the old prostatic cavity. The narrow portion of the dumb-bell occupied the opening between the bladder and the prostatic cavity, which was situated about three-quarters of an inch to the right of the urethral opening. Dr. Hurley said that there was also an incisional hernia of the suprapubic wound. At operation on May 17, 1937, suprapubic cystostomy was performed. The peritoneum of the incisional hernia was avoided with difficulty; the vesical portion of the stone was removed, and while this was being done the stone was fractured at its narrow neck. By dilating the opening into the prostatic cavity, which at first admitted only the index finger, and, with the assistance of a finger in the rectum, the larger portion of the stone, which measured two inches by one and a half inches, was removed.

Renal Calculus.

Another patient shown by Dr. Hurley was a male, forty-nine years of age, who had been admitted to hospital on April 2, 1937, with a history of hæmaturia twenty-one years earlier, when in Egypt with the Australian Imperial Force, and again two and a half years before his admission. There was also a history of severe frequency and scalding on micturition for the previous five months. On examination pyuria was present, but no other abnormality. A skiagram of the urinary tract revealed a huge dendritic calculus filling the pelvis of the kidney and all the calyces, very similar in appearance to a pyelogram in a case of hydronephrosis. Cystoscopy had revealed a definite cystitis, but there was no evidence of any ulceration or bilharzial disease, as had been thought possible from the history. Indigo-carmine injected intravenously appeared at the right ureteric orifice in six minutes and not at all at the left at the end of twenty minutes. On April 19, 1937, the left kidney was removed and the specimen showed a huge left renal calculus with some smaller calculi, forming practically a complete cast of the pelvis and calyces. Convalescence had been uneventful and the bladder symptoms rapidly became less pronounced. The points of interest were the long history, the entire absence of renal symptoms, which was not usual in these large calculi, and the fact that the specimen showed a rather unusually large amount of kidney tissue surrounding the calculi, though clinically there was no evidence of any functional activity in it.

Sarcoma of the Stomach.

Dr. Hurley also showed a patient, sixty-three years of age, who had consulted him on January 12, 1937, about a pain in the right side of the upper part of the abdomen, which had been present for four weeks; it was worse at night and was not related to meals. There had been no vomiting; the appetite was normal; defæcation and micturition were undisturbed. Two or three weeks before the meeting the patient had found a large round swelling in the right side of the upper part of his abdomen, which was not really tender on pressure. The patient was a big man of over sixteen stone, of good colour and nutrition; his temperature and pulse were normal; the heart and lungs showed no abnormality; the urine was normal. On inspection of the abdomen a large rounded mass was found in the right central and upper region of the abdomen; it was not tender, and moved only slightly with respiration. It was freely movable on palpation and could be easily displaced across to the opposite side and to a certain extent downwards, but not back into the loin. It was dull on percussion and there was resonance between it and the liver; it was smooth, rough, spherical in outline, and had no thrill on percussion. There was no jaundice or obvious anæmia.

Dr. Hurley had advised that the patient's abdomen should be explored, but this had not been done until March 2, and in the meantime the patient had carried on his work as usual. On March 2 the abdominal mass could not be differentiated in a plain skiagram of the abdomen; the liver did not appear to be enlarged; a soft tissue shadow, which, if it represented the kidney, was normal, was shown. Ankylopoietic spondylitis was also shown in

the film. The Casoni test gave no reaction. At operation on March 3 a long oblique incision was made over the tumour. There was no free fluid on opening the abdomen and the liver was normal. The tumour was found to be cystic and presented between the stomach and transverse colon. There were many adhesions to the adjacent viscera and omentum, and these were gradually separated. The tumour was found to extend between the layers of the transverse mesocolon to the posterior abdominal wall. It contained two pints or more of chocolate-coloured fluid, evidently old blood and fibrin, which was aspirated. The tumour was freed from the anterior aspect of the pancreas and duodenum with very little bleeding except in the region of the pancreatico-duodenal vessels, which were readily secured.

Dr. Hurley said that it was apparent that the tumour was arising from the posterior surface and greater curvature of the stomach; a clamp was applied across the stomach, parallel with the greater curvature, and a portion of the stomach was removed with the tumour. The opening thus made into the stomach was sutured with a double layer of chromicized catgut and the omentum was lightly sutured over it; all bleeding points were ligated and the abdomen was closed as usual, without drainage; the interior of the stomach seemed normal. The appearance of the vascular-looking growth inside the cyst was not unlike that of a placenta in colour and texture. Microscopic examination showed that it was a small-cell sarcoma; most of the cells were round, though there were other types scattered about, and parts of the growth appeared to be taking on an angiomatous structure.

The patient left hospital on March 23, having made a good recovery except for some bronchitis and patchy consolidation at the base of the lungs, which did not give cause for any anxiety and cleared up completely. He was last seen on April 17, and was very well and proposed to return to work at the end of the month.

Dr. Hurley also showed a patient, thirty-two years of age, who had been admitted to hospital on May 4, 1937, with a history of mid-epigastric pain which had begun seven months earlier. The pain usually occurred two to three hours after meals and was relieved by food and alkaline powders for four or five months, and then recurred with an attack of vomiting. Skiagraphic examination revealed a constant, well-defined filling defect proximal to the pylorus. Palpation in this region showed the presence of a lump which appeared to be about the size of a golf ball, was not tender and could be moved from side to side.

Dr. Hurley remarked that the sharply defined and unusual character of the filling defect, the free mobility and absence of tenderness of the lump, and the good general condition of the patient suggested a tentative diagnosis of innocent tumour of the stomach. At operation on May 6, 1937, a tumour arising from the anterior wall of the stomach and projecting within the stomach cavity was removed together with the adjacent portion of the stomach. Dr. Hurley commented that, apart from some vomiting in the first twenty-four hours, the patient's convalescence had been uneventful. The specimen was demonstrated together with microscopic sections, which showed the tumour to be sarcoma of the stomach.

Multiple Calcareous Deposits in the Brain.

DR. H. F. MAUDSLEY showed a male patient, twenty-three years of age, who had been admitted to the hospital on April 6, 1937, after having taken fifty half-grain "Luminal" tablets with suicidal intent. The patient's history showed that since the age of seventeen he had had attacks at irregular intervals; they usually occurred after some emotional stress; from a description of the attacks they appeared to be gradual epileptiform seizures. After the attacks he was confused and at times performed acts of automatism, of which he remembered nothing afterwards. The boy came from the country and recently had taken a great dislike to his younger brother and was convinced that he was being treated unfairly by his parents and that his brother was persecuting him. He had been unable to settle down to any work and had tried several jobs, but had never been able to remain in any position for more than a few days. The patient stated that he left home because he could not stand his brother and that he was determined to end his life. He had been difficult in hospital, complaining of any noise, was inclined to be truculent, full of grievances, and was definitely paranoidal in his general outlook. He had had two attacks since his admission to hospital. The first was not seen, but he was temporarily in a confused state, which lasted for some hours. The second attack was part of an emotional outburst and conformed more to the functional type of seizure.

On examination he was of healthy appearance, and no abnormality was found on routine physical examination. There was no reaction to the Wassermann test with blood serum and cerebro-spinal fluid, and the cerebro-spinal fluid was under normal pressure. A skiagram of the skull was taken and revealed multiple small calcified areas in the right frontal lobe and one or two smaller deposits in the opposite cerebral hemisphere.

Dr. Maudsley commented that a skiagram of the long bones had shown no abnormality; the Casoni test also gave no reaction; the blood cholesterol was 0·07 *per centum*; the blood phosphorus was 2·5 milligrammes per hundred cubic centimetres and the blood calcium ten milligrammes per hundred cubic centimetres. Dr. Maudsley said that the boy had a psychopathic personality; his behaviour in the ward had been good, though his manner was peculiar and showed paranoidal tendencies; there was no evidence of any definite delusions or hallucinatory state, but rather of the schizophrenic type. Dr. Maudsley said that he considered the questions for discussion in the case of this patient were: (*a*) Were the attacks truly epileptiform and, if so, what relation did they bear to the radiographic findings in the skull? (*b*) Were his personality traits those of the hysteric, the attacks "functional", and was his attempted suicide a theatrical gesture? (*c*) Was he an early dement? (*d*) Were all his symptoms the direct result of the calcified deposits on the brain? (*e*) What was the nature of these deposits? (*f*) Would surgical treatment be of any avail? Dr. Maudsley remarked that one was forced to the conclusion that the symptoms were due to the deposits and that the patient probably had some true epileptiform attacks. It was difficult to state the nature of the deposits; probably they were multiple calcified meningiomata, and it was doubtful whether an operation would help him.

Acute Disseminated Sclerosis.

Dr. Maudsley also showed a male patient, sixteen years of age, who had been admitted to hospital on April 13, 1937, with complete loss of vision in the left eye. The patient had a history of having had a head injury at the age of six years, and for two years following he had suffered from small attacks akin to *petit mal*. He had no symptoms from that time until six months prior to the meeting, when he had an epileptiform seizure, and he had had two other attacks prior to admission to hospital. In March, 1937, he complained of pain in the left orbit followed by sudden and complete loss of vision in the left eye. The patient was seen at the Eye and Ear Hospital at that time and the optic disk was then œdematous. He had no headaches and no sign of increased intracranial tension other than the papilloedema; he was admitted to hospital for observation, and in the course of a week or so the œdema subsided, but an atrophic condition of the disk supervened. A week later the vision of the right eye began to fail and an early optic atrophy was seen to be present.

Dr. Maudsley remarked that no seizures had been observed since his admission into the ward. It was found on neurological examination that there was no other cranial nerve involvement; the deep reflexes were normally active; the left superficial abdominal reflexes were diminished and the left plantar reflex gave an equivocal response. There was no sensory loss and the blood serum failed to react to the Wassermann test; the cerebro-spinal fluid also failed to react. Dr. Maudsley said that a skiagram of the skull showed no abnormality; the left field of vision had not been obtainable owing to gross loss of

vision, and the right had shown general contraction, though during the last few weeks perception of light had returned to the left eye.

Dr. Maudsley thought that congenital syphilis had to be considered, notwithstanding the negative serological findings and absence of improvement as a result of anti-syphilitic treatment. He said that the absence of any increased intracranial pressure, apart from the papilœdema, was against the presence of a cerebral neoplasm; the sudden onset of complete blindness was unusual in the early stages of papilœdema. The condition appeared to be due to a degenerate or inflammatory lesion, and the diagnosis lay between the acute type of disseminated sclerosis, in which an intense retrobulbar neuritis produced the original appearance of papilœdema, and Schilder's disease, which was a periaxial sclerosis commencing usually in the occipital or temporal lobes, but might have an acute inflammatory type of onset. The changes in the optic disk were consistent with *neuromyelitis optica*, a disease in which acute demyelinization of the optic tracts accompanied or was preceded by similar changes in the cord. Dr. Maudsley said that clinically the cord change might dominate the picture, giving rise to severe pains. There was ataxia and marked sensory loss; in some cases the eye changes were predominant and the cord changes slight.

Korsakow's Syndrome.

Dr. Maudsley also showed a female patient, forty-four years of age, who had been admitted to hospital on April 2, 1937, with a history of pain and numbness in both legs for the previous six months; there was also a long-standing alcoholic history. On admission to hospital the patient was of "poor mentality", but quiet, and was easily managed in a general medical ward. On April 12 she became restless and agitated and was transferred to the refractory ward. On admission to this ward she was suffering from visual hallucinations; she saw figures of animals and birds running about the floor, crocodiles and snakes in her bed, and more recently she had seen babies. The day before the meeting the patient was convinced that she had been delivered of twins; she talked in a rapid, tremulous voice, and a definite coarse tremor of her hands was present. Dr. Maudsley thought that she demonstrated well the phenomena of confabulation. She would describe minutely events in which she had taken part—she described how she took her children out for a walk in the morning, whereas actually she had not left her bed. At times the patient could answer questions intelligently, but was generally disorientated both as regards time and space. On examination she seemed to be much improved in her general health. There was no enlargement of the liver; the pupils were equal and reacted normally, the knee and ankle jerks were absent and there was a fairly gross degree of anæsthesia to all forms of sensation in her lower limbs, though this was gradually becoming less; a Wassermann test applied to the blood serum gave no reaction. Dr. Maudsley considered the patient to be suffering from Korsakow's alcoholic psychosis with the typical accompanying peripheral neuritis.

Urological Cases and Films.

DR. HAROLD MOORE demonstrated some urological cases, including one in which a ureterostomy had been done in the left iliac region in a tuberculous patient on whom a right nephrectomy had been performed seven years previously. In the meantime the patient had developed a small irritable bladder with constant pain and extreme frequency of micturition. Conservative treatment had given him no relief. Since the ureteroscopy which had been done ten months before the meeting, the patient had gained eleven pounds in weight and had returned to work. He was able to sleep through the night and was kept quite dry by a catheter retained in the ureter and draining into a urinal.

Dr. Moore also showed some radiographic films and gave a demonstration of the action of the renal pelvis as seen by X ray examination. The skiagrams used by Dr. Moore in the demonstration were obtained by taking serial films of the renal pelvis distended with "Uroselectan". The serial films had been taken as rapidly as possible on a long strip of photographic material especially supplied by the Kodak Company. After development these successive pictures were photographed on a length of sixteen-millimetre cinematograph film and shown as a continuous loop, giving an excellent idea of the contractions of the calyces, the pelvis and the ureter.

(To be continued.)

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Burfitt, Walter Furneaux, M.B., B.S., 1937 (Univ. Sydney), Parramatta District Hospital, Parramatta.

The undermentioned has applied for election as a member of the Tasmanian Branch of the British Medical Association:

Gaha, Thomas Robert, M.R.C.S., 1929 (London), L.R.C.P., 313, Macquarie Street, Hobart.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION): FIFTH SESSION.

The Sections and their Office-Bearers.

THE following is a list of the sections that will meet at the fifth session of the Australasian Medical Congress (British Medical Association) at Adelaide in August next, together with the sectional office-bearers:

Section of Anæsthetics.

President: Dr. Gilbert Troup, 205, St. George's Terrace, Perth, Western Australia.

Vice-Presidents: Dr. H. Hunter, 17, Oxford Street, Waverley, New South Wales; Dr. F. W. Green, 14, Collins Street, Melbourne, C.1, Victoria; Dr. G. V. Anson, 716, High Street, Lower Hutt, Wellington, New Zealand; Dr. Allan D. Lamphee, Smith Street, Walkerville, South Australia.

Local Honorary Secretary: Dr. D. R. Wallman, 18, Grange Road, New Hindmarsh, South Australia.

Section of Ophthalmology.

President: Dr. M. C. Gardner, 12, Collins Street, Melbourne, C.1.

Vice-Presidents: Dr. C. Morlet, 252, St. George's Terrace, Perth; Dr. J. B. Hamilton, 174, Macquarie Street, Hobart; Dr. Cedric K. Cohen, 229, Macquarie Street, Sydney; Dr. W. A. Fairclough, Imperial Buildings, Queen Street, Auckland, C.1; Dr. Brian Moore, 206, North Terrace, Adelaide.

Local Honorary Secretary: Dr. G. H. B. Black, 206, North Terrace, Adelaide.

Section of Oto-Rhino-Laryngology.

President: Dr. G. R. Halloran, 143, Macquarie Street, Sydney.

Vice-Presidents: Dr. C. E. Wassell, Ballow Chambers, Wickham Terrace, Brisbane; Dr. B. Hiller, 174, Macquarie Street, Hobart; Dr. Jas. Hardie Neil, 64, Symonds Street, Auckland, C.1; Dr. Raymond V. Hennessy, 55, Collins Street, Melbourne, C.1; Dr. Adrian Farmer, 260, St. George's Terrace, Perth; Dr. W. Sangster, 175, North Terrace, Adelaide.

Local Honorary Secretary: Dr. R. M. Glynn, 175, North Terrace, Adelaide.

Section of Medicine.

President: Dr. Konrad Hiller, 12, Collins Street, Melbourne, C.1.

Vice-Presidents: Dr. Alex. Murphy, Ballow Chambers, Wickham Terrace, Brisbane; Dr. R. Whishaw, 174, Macquarie Street, Hobart; Dr. J. G. Hislop, 260, St. George's Terrace, Perth; Professor D. W. Carmalt Jones, The Medical School, Dunedin, New Zealand; Dr. A. S. Walker, 185, Macquarie Street, Sydney; Dr. E. Britten Jones, 175, North Terrace, Adelaide.

Local Honorary Secretary: Dr. K. Stuart Hetzel, 178, North Terrace, Adelaide.

Section of Obstetrics and Gynæcology.

President: Professor R. Marshall Allan, University of Melbourne, Carlton, N.3, Victoria.

Vice-Presidents: Dr. F. Brown Craig, 143, Macquarie Street, Sydney; Dr. E. B. Moore, 154, Macquarie Street, Hobart; Dr. G. A. Thompson, Mount Street, Perth; Dr. Kenneth MacKenzie, 27, Princes Street, Auckland; Dr. H. S. Waters, National Mutual Chambers, Queen Street, Brisbane; Dr. R. E. Magarey, 178, North Terrace, Adelaide.

Local Honorary Secretary: Dr. H. M. Fisher, 188, North Terrace, Adelaide.

Section of Dermatology.

President: Dr. K. G. Colquhoun, Albany Road, Toorak, S.E.2, Victoria.

Vice-Presidents: Dr. John H. Kelly, 61, Collins Street, Melbourne, C.1; Dr. J. E. McGlashan, 205, St. George's Terrace, Perth; Dr. J. J. Witton Flynn, 175, Macquarie Street, Sydney; Dr. F. H. Makin, 198, North Terrace, Adelaide.

Local Honorary Secretary: Dr. W. C. T. Upton, 178, North Terrace, Adelaide.

Section of Pædiatrics.

President: Dr. H. Douglas Stephens, 41, Spring Street, Melbourne, C.1.

Vice-Presidents: Dr. E. H. M. Stephen, 135, Macquarie Street, Sydney; Dr. P. A. Earnshaw, Ballow Chambers, Wickham Terrace, Brisbane; Dr. A. W. Shugg, 174, Macquarie Street, Hobart; Dr. L. G. Male, 260, St. George's Terrace, Perth; Dr. Helen Mayo, 197, North Terrace, Adelaide.

Local Honorary Secretary: Dr. D. G. McKay, Lister House, North Terrace, Adelaide.

Section of Pathology, Bacteriology and Experimental Medicine.

President: Professor W. K. Inglis, New Medical School, University of Sydney, Sydney.

Vice-Presidents: Professor H. A. Woodruff, 48, Fellows Street, Kew, E.4, Victoria; Dr. G. C. Taylor, Ballow Chambers, Wickham Terrace, Brisbane; Dr. S. N. Michaels, 260, St. George's Terrace, Perth; Dr. R. E. Richards, Commonwealth Department of Health, Launceston, Tasmania; Professor J. B. Cleland, University of Adelaide, North Terrace, Adelaide.

Local Honorary Secretary: Dr. A. E. Platt, Adelaide Hospital, North Terrace, Adelaide.

Section of Public Health, Preventive Medicine and Tropical Hygiene.

President: Professor Harvey Sutton, School of Public Health and Tropical Medicine, Sydney.

Vice-Presidents: Dr. J. Bell Ferguson, Public Health Department, 364, Little Lonsdale Street, Melbourne, C.1; Dr. R. C. E. Atkinson, Department of Public Health, Perth; Professor Harvey Sutton, Commonwealth Health Department, University of Sydney; Dr. F. S. Hone, 178, North Terrace, Adelaide; Dr. M. H. Watt, Director-General of Health, Wellington, C.1, New Zealand.

Local Honorary Secretary: Dr. A. R. Southwood, 168, North Terrace, Adelaide.

Section of Surgery.

President: Professor G. Grey Turner, Huntercombe Manor, Taplow, Bucks, England.

Vice-Presidents: Dr. F. L. Gill, 250, St. George's Terrace, Perth; Dr. G. Bell, 133, Macquarie Street, Sydney; Dr. W. W. Giblin, 142, Macquarie Street, Hobart; Dr. L. M. McKillop, Orient Line Building, Eagle Street, Brisbane; Dr. B. T. Zwar, 107, Collins Street, Melbourne, C.1; Dr. A. M. Cudmore, 188, North Terrace, Adelaide.

Local Honorary Secretary: Dr. P. S. Messent, 192, North Terrace, Adelaide.

Section of Neurology and Psychiatry.

President: Dr. J. K. Adey, Receiving House, Royal Park, N.2, Victoria.

Vice-Presidents: Dr. H. M. North, 131, Macquarie Street, Sydney; Dr. S. V. Sewell, 12, Collins Street, Melbourne, C.1; Dr. John Bostock, Wickham Terrace, Brisbane; Dr. H. K. Fry, 196, North Terrace, Adelaide.

Local Honorary Secretaries: Dr. L. C. E. Lindon, 188, North Terrace, Adelaide; Dr. H. M. Birch, Mental Hospital, Parkside.

Section of Radiology and Electrical Therapy.

President: Dr. J. G. Edwards, 185, Macquarie Street, Sydney.

Vice-Presidents: Dr. A. S. Johnson, 250, St. George's Terrace, Perth; Dr. R. D. McIntosh, 180, Macquarie Street, Hobart; Dr. P. Clennell Fenwick, 22, Gloucester Street, Christchurch; Dr. John O'Sullivan, 49, Spring Street, Melbourne, C.1; Dr. Val. McDowall, 131, Wickham Terrace, Brisbane; Dr. H. C. Nott, 111, Hutt Street, Adelaide.

Local Honorary Secretary: Dr. H. A. McCoy, 163, North Terrace, Adelaide.

Section of Orthopædic Surgery.

President: Dr. R. B. Wade, 143, Macquarie Street, Sydney.

Vice-Presidents: Dr. C. Gordon Shaw, 55, Collins Street, Melbourne, C.1; Dr. A. Marion Radcliffe Taylor, 205, St. George's Terrace, Perth; Dr. G. A. C. Douglas, Inchcolm, Wickham Terrace, Brisbane; Dr. H. Gilbert, 188, North Terrace, Adelaide.

Local Honorary Secretary: Dr. N. Stannus Gunning, 196, North Terrace, Adelaide.

Section of Naval, Military and Air Force Medicine and Surgery.

President: Dr. F. T. Bowerbank, Kelvin Chambers, Wellington.

Vice-Presidents: Dr. R. Fowler, 85, Spring Street, Melbourne, C.1; Dr. S. G. Gibson, 177, Macquarie Street, Hobart; Colonel J. C. Storey, 185, Macquarie Street, Sydney; Dr. S. R. Burston, 188, North Terrace, Adelaide; Dr. Ernest Culpin, Ballow Chambers, Wickham Terrace, Brisbane.

Local Honorary Secretary: Dr. F. H. Beare, 206, North Terrace, Adelaide.

Section of Medical Literature and History.

President: Dr. L. Cowlishaw, Gordon Road, Lindfield, New South Wales.

Vice-Presidents: Dr. C. F. Macdonald, 455, High Street, East Malvern, S.E.6; Dr. C. P. Bryan, Newspaper House, St. George's Terrace, Perth; Dr. W. E. L. H. Crowther, 190, Macquarie Street, Hobart; Sir James Elliott, 43, Kent Terrace, Wellington, New Zealand; Dr. C. E. C. Wilson, 78, Fisher Street, Fullarton, South Australia; Dr. Neville G. Sutton, 217, Wickham Terrace, Brisbane.

Local Honorary Secretary: Professor J. B. Cleland, University of Adelaide, North Terrace, Adelaide.

Correspondence.

MUSCLE REEDUCATION.

SIR: It is very interesting to read the very sympathetic review in the journal given to Elizabeth Kenny's book, "Infantile Paralysis and Cerebral Diplegia", but it is necessary to comment on a few inaccuracies. The statement is made that "the reeducative exercises are rather disappointing in their lack of variety, and on those described a great deal of reliance seems to be placed on the support of the hands of the reeducator who holds the limb. Most workers in poliomyelitis would agree that the use of the reeducation board is more suitable when the muscles are capable of minimal contractions only." Now this support by the hands is the distinctive feature of the treatment and permits of much more delicate work.

1. Movements of accessory muscles and "trick" movements can be prevented.

2. The mental consciousness of the patient is directed to the exact muscle to be strengthened.

3. Changes of tone in the muscle can be detected and assisted by a trained assistant, to a degree much finer than that giving rise to minimal contraction. The assistant is trained to detect the first slight return of muscle tone, designated the "impulse", and this subliminal stimulation of the muscle is encouraged until the muscle gives minimal contraction, for example, is subtetanically stimulated. From this level any type of reeducation produces tetanic stimulation or true muscle contraction. The reeducation board is only useful when contraction has been achieved.

The writer further considers that the precepts are calculated to be harmful if followed in fresh infections; that takes the view that in fresh infections no care is taken of the limbs of the patient. But this is not so. The methods during the acute stage are: (*a*) mobilization of the limbs in the natural anatomical position by means of soft apparatus, such as small pillows *et cetera*; (*b*) avoidance of "fixed" splinting, especially in the most harmful position, for example, that of abduction of either limb; (*c*) foments to any muscle showing hyperalgesia; (*d*) regular passive movements of all the joints of the paralysed limb.

It has been found that by this method of placing the limb in the natural anatomical position, frequent fomenting and gentle movement that pain will leave the limb within a few days, and then reeducation can commence and deformities are avoided. On the other hand, Sister Kenny claims that in the accepted method of dealing with muscle hyperalgesia by fixed splinting pain recurs after removal of splints even for weeks, and for that reason splints are removed only once or twice a day. Night splints are often applied. As a result of this continued splinting, disuse confirms the paralysis, and there is interference with blood supply and joint stiffness develops. The time is not ripe, however, to discuss the results of the treatment, and the general reports of the investigation committee, to be published shortly, will determine the matter.

Yours, etc.,
F. H. MILLS, M.B., B.S.

Queensland Office,
The Strand,
London,
May 31, 1937.

ANOTHER EXTRAMURAL ASSOCIATION.

SIR: In THE MEDICAL JOURNAL OF AUSTRALIA of June 5, 1937, an editorial entitled "Another Extramural Association" deplores the formation of the Australian Orthopædic Association for two reasons:

1. Because it admits honorary and corresponding members who may not be members of the British Medical Association.

2. Because the association desires to provide a competent body to advise and act in matters concerning the prevention, treatment and training of the cripples and potential cripples of the community.

In answer to the first reason, we believe that scientific truth can only be obtained through close cooperation with all shades of medical opinion throughout the world, and nowhere is medical science so truthful as in England, where such extramural associations abound. Orthopædic surgery, like general medicine and general surgery, is international in its outlook, and affiliation with kindred bodies overseas permits of more intimate exchange of opinions and ideas between the individual members of those bodies which is possible only as long as we remain a separate association.

Let it be noted that only active members have executive power in this association, and these members are all members of the British Medical Association. The parent body may rest assured that this association will do nought to discredit it nor abrogate its rights in matters concerning the profession as a whole.

Orthopædic surgery has been stated to be merely a branch of general surgery. This may be true of this specialty in Australia, due chiefly to our lack of hospital accommodation, follow-up schemes and financial assistance for orthopædic cases; but in England and America the word "merely" has long been erased, and it is a sad commentary on organized medicine in Australia that we lag sadly behind these countries in the attack on the cripple problem.

In answer to the second reason for our opprobrium, we state without equivocation that the preventive treatment and training of cripples can be placed on a sure foundation only by a body of orthopædic surgeons after years of constant endeavour.

With these considerations in mind, one might have expected a little more hearty welcome for the association. It would be difficult to maintain that the need does not exist for the objects that are postulated in the constitution. It is a universal experience that in any cause more can be accomplished by a small body of enthusiasts than by a host of lukewarm supporters, and if the Australian Orthopædic Association can place orthopædic surgery in its destined place, both in its professional and social relationships, its existence will be more than justified.

Yours, etc.,
A. R. HAMILTON,
Honorary Secretary,
Australian Orthopædic Association.

135, Macquarie Street,
Sydney,
June 15, 1937.

THE ADELAIDE CONGRESS: SECTION OF NEUROLOGY AND PSYCHIATRY.

SIR: The following subjects will be discussed in the Section of Neurology and Psychiatry at the forthcoming congress: "Circulatory Lesions of the Brain Brought Out by the Microscope", "The Pathology and Treatment of Syringomyelic Cavities", "The Multiplicity of the Encephalitides", "The Clinical Course of Tuberculous Meningitis", "Psychiatry of the School Period", "Results of the Investigation of Reflex Epilepsy", "How Civilization Manufactures Neuroses", "Cerebral and Cerebellar Abscess", "Surgical Anatomy of the Lumbo-Sacral Sympathetic, and the Effects of Sympathetic Denervation of the Lower Limbs in Vascular Disorder", "Papilloedema: Its Pathology and Effect upon Vision and its Significance in Neurology", "Pathogenesis and Treatment of Subacute Combined Degeneration of the Cord", "The Treatment of Trigeminal Neuralgia", "Some Aspects of Post-Operative Management in Neuro-Surgery".

Should any member of congress desire to speak in the discussions on any of the above-mentioned subjects, the honorary secretaries would be glad to hear from them at an early date.

Yours, etc.,

LEONARD C. E. LINDON,
H. McI. BIRCH,
Honorary Secretaries,
Section of Neurology and Psychiatry.

178, North Terrace,
Adelaide,
June 17, 1937.

NATIONAL HEALTH INSURANCE.

SIR: The Federal Council of the British Medical Association has very rightly been moved to consider the remuneration due to members under a possible health insurance scheme. Might I suggest that, in the opinion of many of us, the financial side of the profession in general has not received sufficient attention.

Without elaborating, I think that I may say that the medical profession is doing too much work for nothing, especially in the public hospitals, which are unable to cope with the demands upon them. Our willingness to perform all this work is a relic of that past time which is adequately summed up in the phrase "deserving poor". Now, however, we are very, very largely looked upon as a means of saving money in order to expend it upon wireless, lottery tickets and S.P. betting. This is said in no spirit of discontent or of exaggeration, but is, I think, a statement of cold fact.

I do not suggest that we even consider curtailing the work we at present do for nothing, but that at least some move be made in the direction of doing it not for nothing.

I suggest:

1. Honorary medical officers at hospitals, clinics *et cetera* be allowed a rebate on their income tax.

2. If a medical benefit scheme be not brought in, that all persons, whether employees or otherwise, with an income under, say, £400 *per annum* be given a card showing the amount earned, rent, dependants *et cetera*, and that from these details some mathematical formula be evolved which would show whether the holder was entitled to (*a*) complete public hospital service, (*b*) a restricted service. These details would be "official" and correct, and much time and clerical work would be saved at the hospitals, where these facts are at present inquired into. Both the institution and the prospective patient would know whether or not he were eligible for treatment.

I suggest no further details at all, this being simply a suggestion of mine cast upon the present stormy waters of medical practice for the contemplation of my colleagues.

In conclusion may I reiterate that I consider that the rebate on income tax system is well worthy of consideration.

Yours, etc.,

H. BURNETT BRUCE.

Collaroy,
New South Wales,
June 27, 1937.

PROTEIN SHOCK IN GONORRHŒAL OPHTHALMIA.

SIR: I had not intended to prolong the correspondence with Dr. Marks, because it seems impossible to influence his non-protein shock complex by figures from a clinic of 25,000 cases of gonococcal ophthalmia *per annum*, or from one's own personal experience. But I have decided that I might have one more, and my last, remark by quoting from the 1937 edition of Sandford Gifford's "Hand Book of Ocular Therapeutics". It would be idle to decry this authority—Professor of Ophthalmology of the North Western University Medical School, Chicago, and a name of the greatest respect and repute throughout America and Europe. Discussing the treatment of gonorrhœal conjunctivitis, he writes:

> Next to irrigations, probably the most important therapeutic measure in this disease is *the use of foreign protein injections*. [The italics are in the text.] In infants whole milk boiled for four minutes serves admirably for this purpose. While most cases will clear up without corneal complications on irrigations alone, one can never tell which will turn out to be an unusually severe case, and it is probably safest to use milk injections from the beginning in every case. In fact, Pillat has discussed the question of whether or not a physician is guilty of malpractice in cases where foreign protein is not employed . . . Pillat has shown that the gonococci disappear from the secretion and epithelial cells rapidly after effective foreign protein therapy.

Continuing, and referring to adult infection:

> It is not known why the disease is nearly always so much more severe in adults than in infants, the cornea being involved in a very large proportion of cases, until very recent years. With the routine use of foreign protein the prognosis in these cases has undoubtedly been improved. Whereas corneal involvement was formerly almost the rule, it is now often possible, when a case is seen early, to avoid it entirely.

I do not propose to reply to any further correspondence upon this subject, and I trust I have satisfied most of those who have read the letters, that my urge to use milk injections as a routine therapeutic measure in all cases of gonorrhœal conjunctivitis has been amply justified by the experience of my own cases and that of some of my immediate colleagues, and by the authorities I have quoted in support of the measure.

Thanking you, Mr. Editor, for your space.

Yours, etc.,

GRANVILLE WADDY.

227, Macquarie Street,
Sydney,
July 1, 1937.

THE SURGICAL TREATMENT OF SPASTIC PARALYSIS.

SIR: In Dr. Royle's very interesting paper on "The Surgical Treatment of Spastic Paralysis" (THE MEDICAL JOURNAL OF AUSTRALIA, June 26, 1937) there are some things that should not go uncriticized.

That diastolic pressure in the spastic limb is higher than elsewhere is a very intriguing statement. If in any system of freely communicating tubes, fluid pressure in one is greater than in the others, a current will be determined from the tube of higher pressure towards the tubes of lower pressure. The arterial system consists of tubes filled with fluid and freely communicating with each other. So, therefore, in Dr. Royle's cases there ought to have been, at diastole, a current from the arteries in the spastic limb towards the other arteries and in the opposite direction to the circulation. A difference of 40 millimetres ought to cause quite a rapid current. At systole, pressure being the same as elsewhere, flow ought to be in the normal direction. A to-and-fro movement should therefore be present in the arteries of the spastic limb. It would be interesting to know if Dr. Royle has observed any indications of such a fluctuation. Signs such as those of aortic patency, the effect of an unfilled artery, might be present—flushing and paling of the nail bed on gentle pressure, a similar phenomenon on irritation of the skin, an impact on the vessel wall at systole resembling Corrigan's pulse. A murmur might also be located about the branching of the external iliac artery. There is, however, another explanation possible for the observed

apparently high diastolic pressure. It is as follows. Clinical blood pressure estimations are not estimations purely of blood pressure. Included in the total pressure recorded is resistance of the tissues to inward crushing by the manometer cuff. In a young normal subject the part played by this resistance is small, but where the muscles are spastic it may be great. Possibly this extra resistance (over and above that of the normal tissues) disappears when air pressure in the cuff is near systolic, and accordingly gives a record of systolic pressure which is not different from that obtained in other regions. There is thus produced an apparently normal systolic pressure and a high diastolic.

The other point refers to circulation about the nerve cells after ramisection. If I understand Dr. Royle correctly, his statement means that the more rapidly blood streams through capillaries, the less of oxygen do the tissues served by the capillaries receive. This he believes is the result of the rapid passage of oxygen particles or, what amounts to the same thing, oxygen-charged red cells, past the tissues. In consequence, the tissues have not time to seize upon the oxygen thus carried past them. Now a condition analogous with quick blood flows occurs in a blacksmith's fire when one blows the bellows rapidly, but, far from being reduced thereby, the rate of combustion is increased. Indeed the ordinary way in which one increases the rate of combustion is by increasing the rapidity of the draft. How does this effect come about? The oxygen is carried past the glowing coke more rapidly, and so, if Dr. Royle's statement were true, combustion should be retarded. But there are other factors: waste products are carried away more swiftly, and if oxygen passes more rapidly away, so does a new supply arrive as rapidly. The total effect is to increase the local oxygen pressure and so increase the rate of combustion. It is difficult to see how a dilatation of the arterioles and capillaries can have any different effect. The oxygenated hæmoglobin is carried past the tissues more quickly, certainly, but so is a new supply brought up as quickly. In addition the hæmoglobin which has given up its oxygen is carried away more quickly. The total effect, as in the blacksmith's fire, is to increase local oxygen pressure. This ought to increase oxygen consumption, other factors being equal. Probably the effect of ramisection on nerve cells is not due to a too rapid oxygen stream, but to some effect on the cell itself from the operation. If the cell suffers from oxygen lack, it is probably due to defective capacity for oxygen absorption, possibly the result of mechanical shock. But the defective cell activity may really be due to upset metabolism and perhaps some alteration in cellular electrical conditions.

Yours, etc.,

WILLIAM P. KELLY, F.R.C.S.I., etc.

Simpson's Road,
Bardon,
Brisbane,
July 1, 1937.

The British College of Obstetricians and Gynaecologists.

EXAMINATIONS FOR MEMBERSHIP.

A NEW regulation has been added to those governing application for admission to membership of the British College of Obstetricians and Gynæcologists. Candidates are admitted to membership after passing an examination which is held in London twice yearly, in January and July. The new regulation reads as follows:

> Applications from candidates whose resident qualifications have been obtained overseas, either wholly or in part, shall be referred to the appropriate Dominion Reference Committee before consideration by the Examination Committee.

Intending candidates, in order to save delay and disappointment, should therefore communicate with one of the members of the Reference Committee in Australia before going to England. The committee can then send its opinion, as to whether the resident qualifications (general, obstetrical and gynæcological) are sufficient or not, to the Examination Committee of the British College of Obstetricians and Gynæcologists.

The members of the Australian Reference Committee are: Professor J. C. Windeyer (Chairman), Sydney; Professor Marshall Allan, Melbourne; Dr. T. G. Wilson, Adelaide.

In the regulations previously adopted by the British College of Obstetricians and Gynæcologists there are two that refer to the case records which must be submitted to the College before examination. They are as follows:

1. Case records must be vouched for by a superior officer or other official of a hospital as being those of cases under the personal supervision and care of the candidate.

2. Candidates whose resident appointments have been held overseas must bring their case records with them, duly certified.

Proceedings of the Australian Medical Boards.

VICTORIA.

A MEETING of the Medical Board of Victoria was held on June 2, 1937.

Registrations: Anna Lydia Hansen, M.B., Ch.B. (New Zealand), 1931; Mary Aletta Saunders, L.R.C.P. (London), 1931.

An application for registration made by Norman Roy Paterson, M.B. (Sydney), 1921, was deferred for consideration at the next meeting.

The Board refused to register Kurt Aaron and Moritz Meyer, each of whom produced the triple diploma of the Scottish Conjoint Board of 1937, on the ground that there was no evidence that they had passed through a regular course of medical and surgical study of five or more years' duration within the meaning of the *Medical Act*.

An application made by Eugene Sandner for the registration of the F.R.C.S. (Edinburgh), 1932, as an additional qualification was granted.

The names of the following deceased practitioners were removed from the register: Patrick Joseph Godfrey, Mabel Jessie Baillie, Percy Newall Whitehead and John Francis McGivern.

The question of removing the name of Thomas Edwin George from the register under the provisions of Section 9 of the *Medical Act*, which relates to failure to notify change of address, was deferred pending further inquiries as to the whereabouts of this practitioner.

A letter was received from the Medical Board of South Australia intimating that the Board had agreed to accept, on a basis of reciprocity, degrees of British Indian universities which are accepted by the General Medical Council of the United Kingdom.

A report regarding the dosages of heroin prescribed by a practitioner was received from the Investigation Branch of the Customs Department. After examining the various papers submitted and making inquiries the Board was of opinion that it was not possible to hold that the dosages were excessive, in the circumstances, and no further action was taken.

Further consideration was given to reports obtained in regard to the alleged association of three practitioners with medical institutes, and it was decided that no good purpose would be served by continuing proceedings.

Francis Harold Oliphant produced evidence that his correct name is Francis Carlton Oliphant, and his request that the register be amended accordingly was approved.

AN APPEAL.

THE Organizing Secretary of the Rachel Forster Hospital for Women and Children, Redfern, New South Wales, is launching an appeal to motor car owners to donate their used tires to be sold in aid of the funds of this hospital.

The General Rubber Company, 113-115, William Street, City, has generously offered to receive any tires that may be left there by motor car owners; on the other hand, if those who cannot leave tires will telephone the hospital (M 6763), an arrangement will be made to have them collected.

Books Received.

MODERN DIETARY TREATMENT, by M. Abrahams, M.A., M.Sc., and E. M. Widdowson, B.Sc., Ph.D.; 1937. London: Baillière, Tindall and Cox. Crown 8vo, pp. 336. Price: 8s. 6d. net.

FAVOURITE PRESCRIPTIONS, INCLUDING DOSAGE TABLES, ETC., HINTS FOR TREATMENT OF POISONING AND DIET TABLES, by E. Ward, M.D.; Fourth Edition; 1937. London: J. and A. Churchill Limited. Foolscap 8vo, pp. 156. Price: 7s. 6d. net.

THE TREATMENT OF DIABETES MELLITUS, by E. P. Joslin, M.D., M.A., with the cooperation of H. F. Root, M.D., P. White, M.D., and A. Marble, M.D.; Sixth Edition, thoroughly revised; 1937. Philadelphia: Lea and Febiger. Medium 8vo, pp. 707, with illustrations. Price: $7.00 net.

Diary for the Month.

JULY 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JULY 13.—Tasmanian Branch, B.M.A.: Branch.
JULY 20.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 20.—Tasmanian Branch, B.M.A.: Council.
JULY 21.—Western Australian Branch, B.M.A.: Branch.
JULY 22.—New South Wales Branch, B.M.A.: Clinical meeting.
JULY 23.—Queensland Branch, B.M.A.: Council.
JULY 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JULY 28.—Victorian Branch, B.M.A.: Council.
JULY 29.—South Australian Branch, B.M.A.: Branch.
JULY 29.—New South Wales Branch, B.M.A.: Branch.
AUG. 3.—New South Wales Branch, B.M.A.: Organisation and Science Committee.
AUG. 3.—Tasmanian Branch, B.M.A.: Council.
AUG. 4.—Victorian Branch, B.M.A.: Branch.
AUG. 4.—Western Australian Branch, B.M.A.: Council.
AUG. 5.—South Australian Branch, B.M.A.: Council.
AUG. 6.—Queensland Branch, B.M.A.: Branch.
AUG. 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 10.—Tasmanian Branch, B.M.A.: Branch.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xvii to xx.

BROKEN HILL AND DISTRICT HOSPITAL, BROKEN HILL, NEW SOUTH WALES: Resident Medical Officer.
CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.
COMMONWEALTH DEPARTMENT OF HEALTH, CANBERRA, F.C.T.: Medical Officers.
FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Junior Resident Medical Officer.
LACHLAN PARK HOSPITAL, NEW NORFOLK, TASMANIA: Assistant Medical Officer.
MOOROOPNA BASE HOSPITAL, MOOROOPNA, VICTORIA: Junior Resident Medical Officer.
ROYAL AUSTRALIAN AIR FORCE: Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £1 for Australia and £2 5s. abroad *per annum* payable in advance.